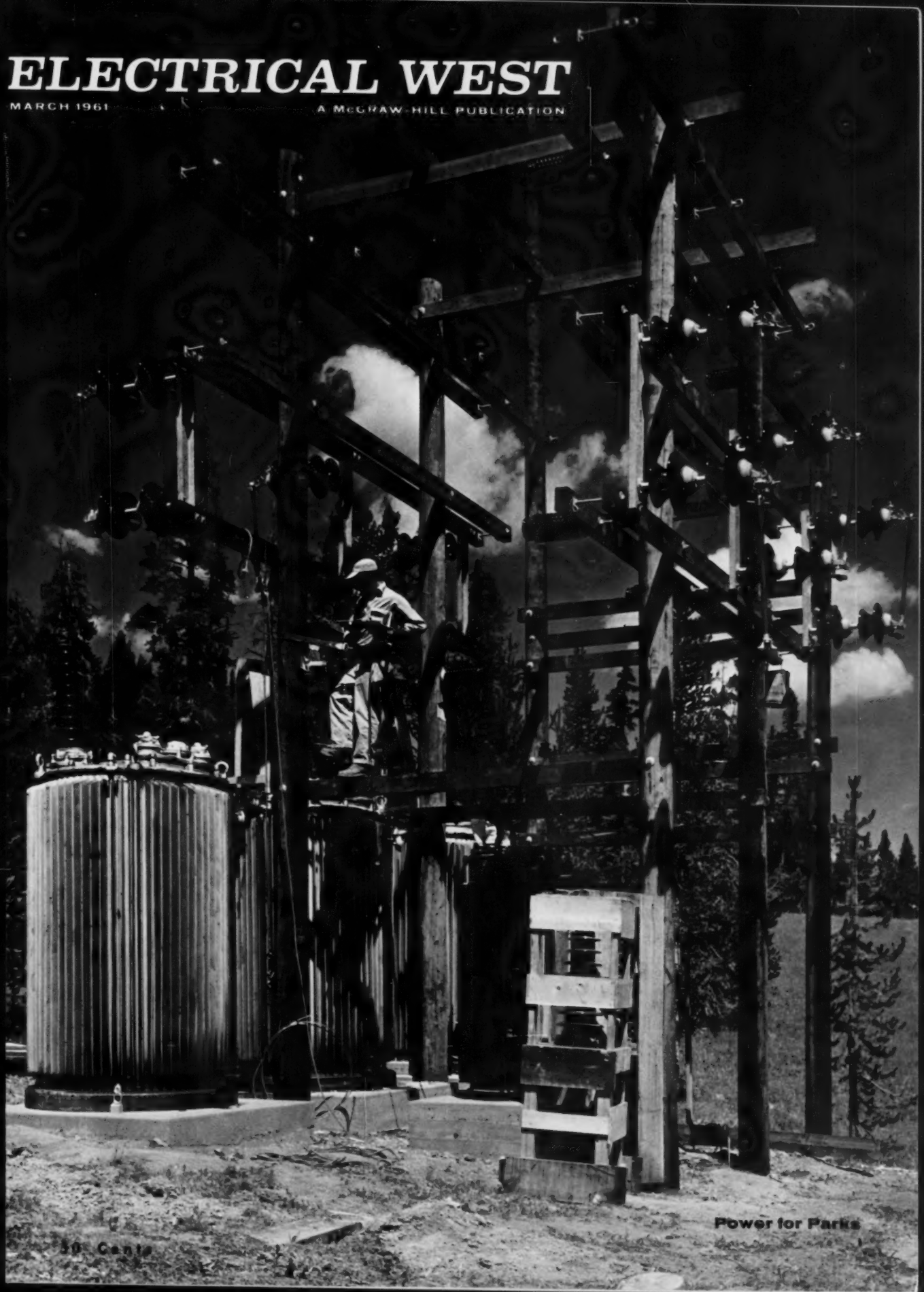
ELECTRICAL WEST

MARCH 1961

A McGRAW-HILL PUBLICATION



Power for Parks

50 Cents

Strandvise® alone

has these straight-down-the-line abilities

FEED-THRU *ability*

Nothing approaches the value and ease of the feed-thru mechanical chuck for placing and tensioning a guy. Use no tensioning tools until after the guy is in place. Then each click of the hoist feeds strand thru the chuck to desired tension.

ONE-MAN *ability*

A one man "crew" can complete a down guy easier, faster and safer than with any other method. Strandvise is a "natural" even for EHS strand.

USE *ability*

No precision pre-cutting. No markers to locate and line up. No size color codes to remember.

NO-CORRODE *ability*

External—Tube and yoke are each a homogeneous aluminum alloy. There is no coating . . . scratching or abrasion cannot initiate corrosion.

Internal—Both laboratory tests and field service exposure (natural cycling) have repeatedly failed to show evidence of corrosive attack on strand within the gripping area. Tapers and initial tension wedge and seal that area.

RE-USE *ability*

Strandvise is wholly reusable; once, twice, or a dozen times.

ADJUST *ability*

Luck plays no part during the tensioning operation. Strandvise "swallows" strand with each click of the hoist—Tension is a fact.

NO-ABRASION *ability*

The stainless steel bail has no peers. There is no coating to abrade away. 18-8 stainless steel will never rust or deteriorate in any known corrosive atmosphere.

REACH *ability*

The overall length of Strandvise averages less than 12 inches for most sizes.

SAFE *ability*

No need to remove come-along or hoist to gain working space before the job is completed. With Strandvise the load is always captive.

NATURAL *ability*

Nothing to study—nothing to avoid—nothing to ("look-out!") for—wholly safe to install without safety glasses and gloves (where regulations permit).

NO-FOUL-UP *ability*

The only wire is the guy wire. The only ingenuity called for is already built into Strandvise.

PROCEDURE *ability*

Give or take guess work is no part of Strandvise—nothing to get ready, nothing to allow for. (Stainless bail cannot stretch.)

MULTIPLE GUY *ability*

Double and triple guying to one guy rod presents no working space problems with Strandvise.

TAMPER-PROOF *ability*

Mischievous release is impossible unless the "villain" has a hoist and come-along.

COST *ability*

You can use every Strandvise you buy . . . none are rendered useless by storage or handling damage, or by field mistakes.

Installed costs favor Strandvise all the way. One man for five minutes is all the "help" Strandvise needs for a *completed* down guy.

HOLDING *ability*

Forged and case hardened chucks are quality controlled at factory and are consistent by nature of design and tooling. No grit or combination of coatings to be controlled and trusted.

During 27 years of continuing production, it has never been reported that a Reliable Feed-Thru Deadend Chuck let go a line. (Strandvise is in its twelfth year of production.)

Reliable

A Symbol of Integrity Since 1909

RELIABLE ELECTRIC COMPANY

Franklin Park, Illinois

Two Misunderstood Words

When shallow critics denounce the profit motive inherent in our system of private enterprise, they ignore the fact that it is an economic support of every human right we possess and, without it, all rights would soon disappear.

DWIGHT D. EISENHOWER. SPEECH. OCTOBER 1948

In the second article of this series we talked about the basic needs of life. Before entering into further discussions of the way we Americans live and make our living, it might be well to clarify a fundamental misconception about two words—"profit" and "capital." These words arouse emotions. "Profit" is an ugly word to many people. Social cartoonists have pictured a few bloated "capitalists" taking huge bags of money out of circulation, implying that this was at the expense of all the people. Wartime "profiteers" helped give a black eye to the word. Communists continually refer to the huge "profits" made by large corporations, stating that this money could and should be divided up among the workers. This is what really happens but in such a roundabout way that it's not easy to follow.

"Capital" also is a misunderstood word. People who have money or control money are called "capitalists" and are a prime target of the socialist and communist propaganda. In the U. S. most of us are capitalists to some degree because, as a nation, we are reasonably thrifty. Our savings are our "capital." In fact, all capital represents savings. It's the money that you and I and all businesses have saved out of our daily operations.

As individuals and companies, we save to protect ourselves against the future. We can keep these savings under the mattress, put them in a bank, purchase insurance or loan them out to other people or businesses who need money and are willing to pay us "rent" or interest on it. If we put them in a bank or insurance company, these organizations in turn loan them out and pay us a part of the rent or interest they get from the borrower. All the *capital* in the country represents our combined savings.

Thus, there's an important relationship between these collective savings, or capital, and the collective prosperity of the nation. Out of the savings of individuals comes the money that is essential for economic growth. Those savings, if put in the bank, into insurance or invested in stocks or bonds, give business organizations the means to build new plants, make more jobs and develop new products. This makes jobs in the construction industry as well as jobs in these new production facilities.

It's a safe bet that everyone who reads this is a capitalist. If you are buying a home, you are investing part of your income to obtain a capital asset. Your "profit" is either in savings on rent or the income from someone you can rent it out to. If you have insurance you are investing today to get something more in the future. Your policy represents part ownership in American industry because the insurance company invests or lends your money to corporations to help them build the new factories, buy new tools or otherwise improve their operations.

Or you may invest your savings in things directly for the benefit of yourself or your family.

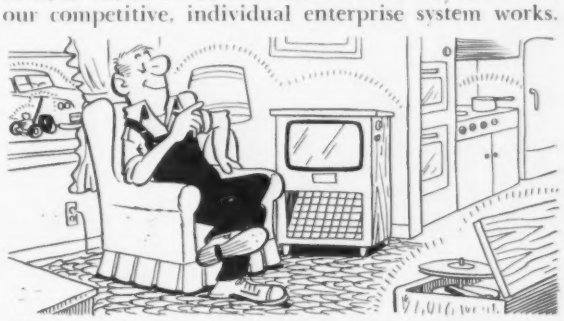
Look around you. All of the things you have bought for long-time use and enjoyment are "capital assets." Your furniture, appliances, TV, even your automobile, represent savings you have invested in good living. They don't pay a "return" in money but you could have taken what they cost and "invested" in stock, bonds, insurance or real estate and enjoyed a money return, had you chosen.

Meanwhile, these savings which have been invested in your own capital assets also have kept people working in the mines, mills, factories and railroads who bring materials and products to you.

Almost everybody hopes to put at least his savings in a place where they will earn interest or dividends and thus grow in value. Just how much interest or dividends are paid depends upon the risk involved in loaning out your money. If you might lose all or part of it, you naturally will ask a higher return than if the full amount is guaranteed to be returned, such as is the case of a savings bank.

The main points are: (1) that capital really is savings; (2) that savings can be loaned or invested on a rental basis that will pay the loaner, large or small, a "rent" or "return" on that money; and (3) the money loaned is generally used to create more jobs and more and better products.

In the next article we will try to show that "profit" is merely the rent that businesses and corporations pay on the money that they have obtained from thrifty people to build factories, buy tools and provide places to work. If we can remember that capital is merely the collective savings of all of us and that "profit" is merely the amount of rent that the invested savings earn, it will be easier to understand the ways in which our competitive, individual enterprise system works.



Count your blessings (they're probably either profits or capital)

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Cover: Montana Power Co.'s 2,000-kva substation feeds Canyon Village through two 4/0 copper circuits and reclosers and the line to Lake and Thumb, which is protected by 50-kv fuses. Line can be sectionalized in case of trouble. The company completed 94-mile transmission line seven months ahead of schedule, providing Yellowstone Park with its first commercial power. Montana Power photo.

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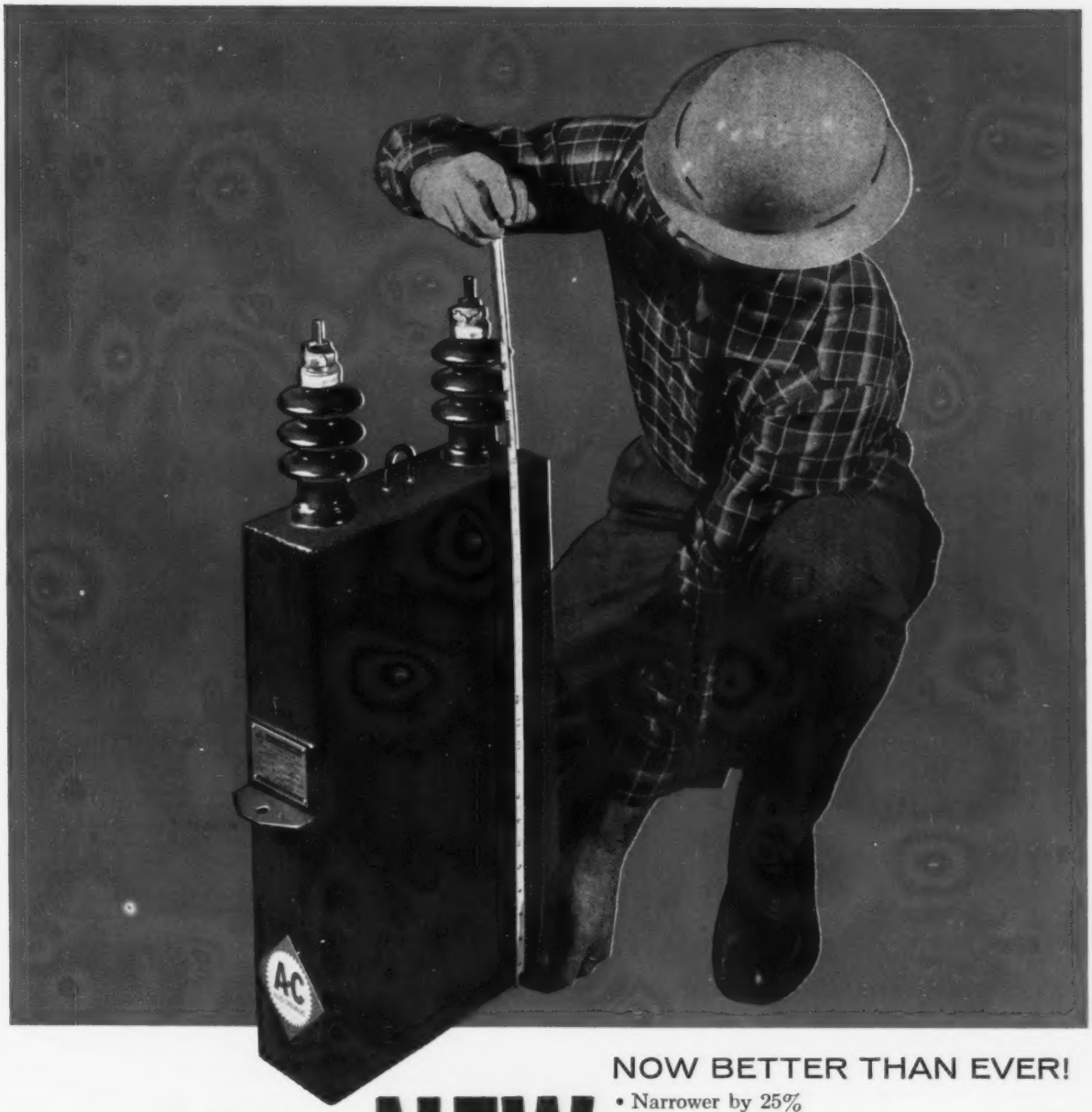


NOW BETTER THAN EVER!

- Narrower by 25%
- Lighter by 23%
- Higher basic impulse levels
- Hot spots minimized
- Lower current densities at the contact points
- Low pack temperatures
- Higher inrush current safety factor.

ALL-NEW CAPACITORS

Specify *extended foil* construction to obtain *all* these benefits!

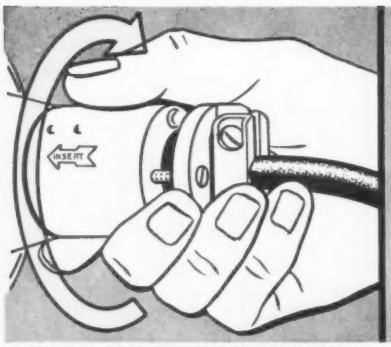
For details call, write or wire . . .

ALLIS-CHALMERS

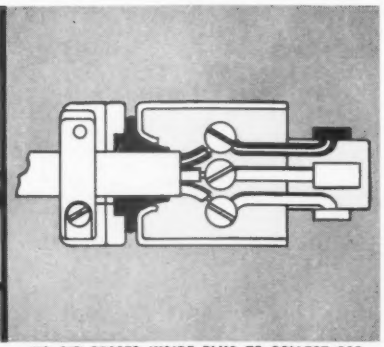
EXTENDED FOIL CAPACITORS

A-1423

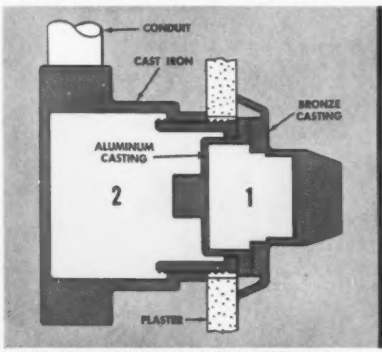
For phone number of closest representative see advertising index in back of book.



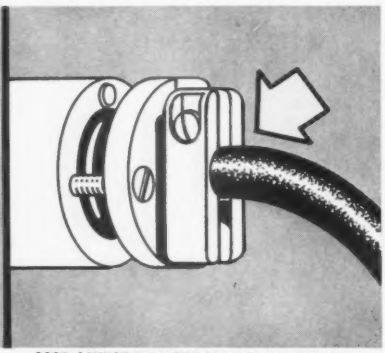
NO ARCING WHEN PLUGGING OR UNPLUGGING. Outlet is electrically "dead" until plug is inserted and rotated 22-25°. Reverse turn disconnects current before plug is removed. Spring pressure and keyed construction prevent accidental disconnection.



NO AIR SPACES INSIDE PLUG TO COLLECT GAS OR MOISTURE. After plug is wired to cord, electrician pours a self-hardening insulating resin into all air spaces. Interior of plug becomes solid, water-tight, vapor-tight mass.



TWO SAFETY CHAMBERS IN WALL OUTLET. Gas-tight chamber No. 1 (bronze and aluminum castings) contains and seals off switching mechanism. Cast iron chamber No. 2 keeps minor internal explosions from spreading to room.



CORD CANNOT PULL OUT OF PLUG. Double-clamping cord-grip relieves strain on plug terminals. And because terminals and wires are completely embedded in insulating resin, connections cannot loosen to cause arcing.

NEW

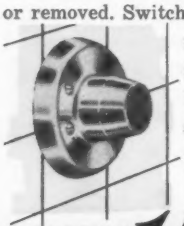
EXPLOSION-PROOF

RECEPTACLE AND PLUG

FOR CLASS I, GROUP C OR D, ATMOSPHERES

The Hubbellock Explosion-Proof Receptacle and Plug prevent arcing when electrical connections are made or broken in explosive atmospheres. No special wiring is required for installation in new or existing structures.

There are no air spaces in the plug where explosive gases can collect. No current can flow to the receptacle contacts while the plug is being inserted or removed. Switching takes place inside a vapor-sealed safety chamber of heavy bronze and aluminum castings.



Any 20-ampere, 125-volt, 60 cycle A.C. appliance may be operated from the receptacle by substituting the Hubbellock Explosion-Proof plug for the present plug. Appliances equipped with the Explosion-Proof plug will also operate in conventional 3-wire Hubbellock receptacles.

Plug and receptacle are listed by Underwriters' Laboratories and are described by the National Fire Protection Association for use in Class I, Group C or D, explosive atmospheres. They are ideal for hazardous industrial areas and for hospital operating and delivery rooms.

Write now for detailed specifications and prices.

"Hubbellock" is a registered trademark of Harvey Hubbell, Inc.

EXPLOSION PROOF *Hubbellock*® WIRING DEVICES

HARVEY HUBBELL, INCORPORATED • BRIDGEPORT 2, CONNECTICUT In Canada: Scarborough, Ontario

For phone number of closest representative see advertising index in back of book.

Meetings Calendar

MARCH

2—*San Diego Bureau of Home Appliances*, Spring Conference, Balboa Park, San Diego.

8-10—*California Municipal Utilities Assn.*, 29th annual conference, Sheraton-Palace Hotel, San Francisco.

20-25—*NWPPA/OSC* Meter School, Oregon State College Campus, Corvallis, Ore.

25-27—*California Home Economics Assn.* convention, Jack Tar Hotel, San Francisco.

28-30—*Electrical Maintenance Engineers Assn. of California*, 7th Electrical Maintenance Conference, Founders Hall, USC, Los Angeles.

APRIL

5-7—*Northwest Public Power Assn.*, annual meeting, Wenatchee, Wash.

5-7—*Radio Technical Commission for Marine Services*, spring convention, Sheraton-Palace Hotel, San Francisco, Calif.

5-9—*Electrical Maintenance Engineers Assn. of Northern California, Electrical Industry* Show, San Francisco.

6-7—*Pacific Coast Electrical Assn.*, Engineering & Operating Section, Ambassador Hotel, Los Angeles.

16-18—*Rocky Mountain Electrical League*, spring conference, Harvest House, Boulder, Colo.

17-18—*PCEA*, Business Development Section, Sheraton-Palace Hotel, San Francisco.

26-28—*Northwest Electric Light & Power Assn.*, Engineering & Operation Section, Personnel & Safety Section, Purchasing & Stores Committee, Sheraton-Portland Hotel, Portland.

26-29—*National Electrical Contractors Assn.*, Tri-District meeting, Hotel Fairmont, San Francisco.

27-28—*PCEA, Administrative Services* Section, spring conference, Villa Hotel, San Mateo, Calif.

28-May 3—*San Diego Bureau of Home Appliances*, Electric Bldg., Balboa Park, San Diego.

MAY

1-2—*Illuminating Engineering Society*, Intermountain Region Conference, Hotel Utah, Salt Lake City.

3-5—*IES*, South Pacific Coast Region conference, Sacramento Inn, Sacramento.

8-9—*IES*, Pacific Northwest Region conference, Harrison Hot Springs, Harrison, B. C.

17-19—*Pacific Coast Electrical Assn.*, annual conference, Sheraton-Palace Hotel, San Francisco.

20—*International Association of Electrical Inspectors*, three-chapter joint meeting; Northern and Central California, Sacramento Valley, Fresno, Calif.

24-26—*Northwest Electric Light & Power Assn.*, Accounting & Business Practice Section, Medford Country Club, Medford, Ore.

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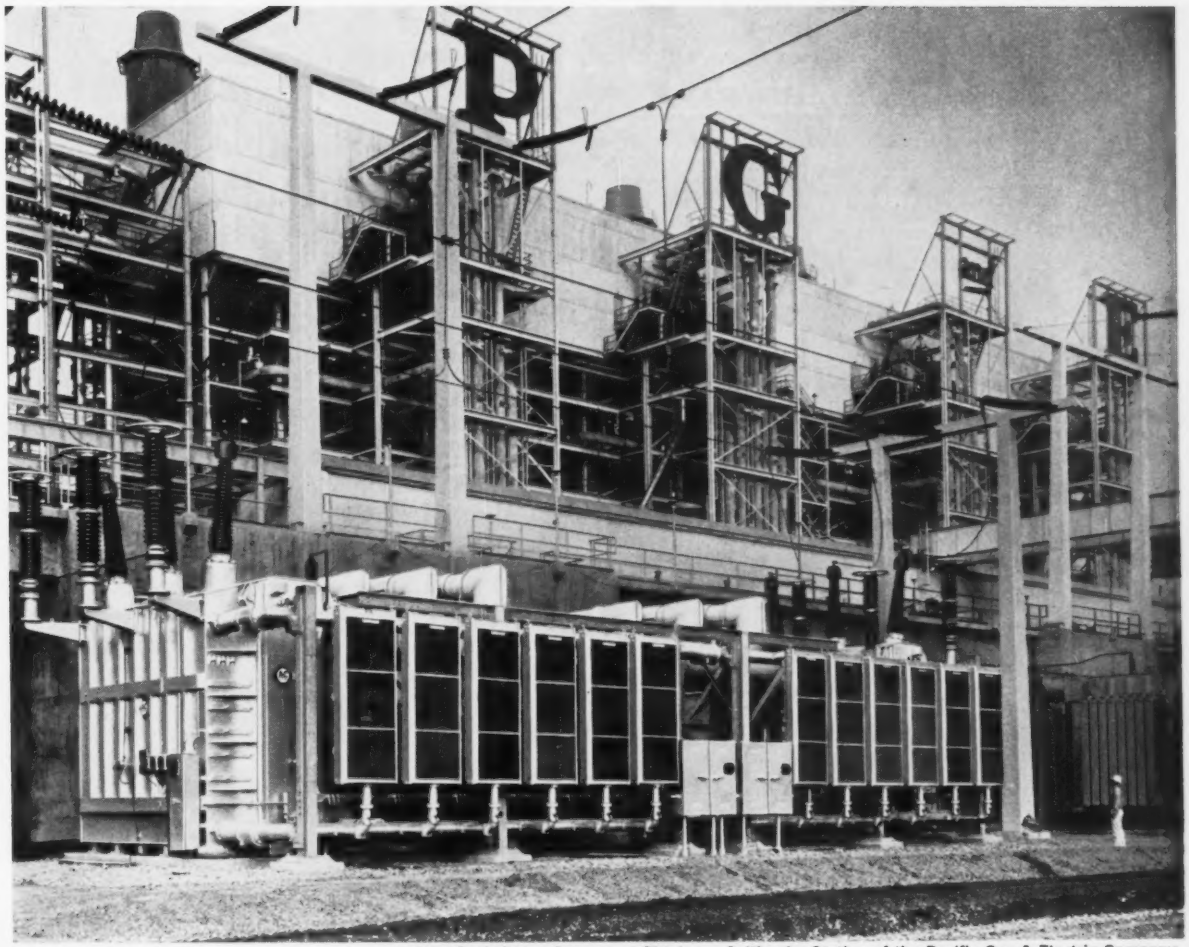


Dual-Cooled transformers at Pittsburg, California, Station of the Pacific Gas & Electric Company.

Hidden transformer capacity uncovered!

Dual-Cooled* transformers boost emergency capacity 33% without loss of life

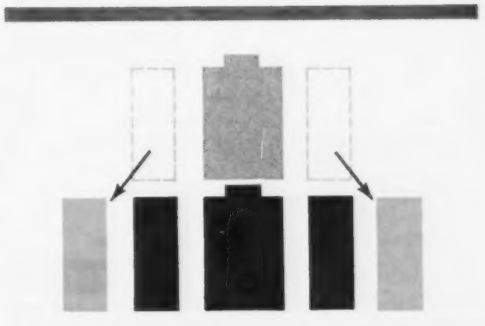
Dual-Cooled transformers — an A-C development — are utilized at this central station to permit two-thirds of the turbine output to be carried in the event one transformer is off the line. In an emergency, cooling equipment from both units is connected to the functioning transformer. Result: Capacity of either unit with dual-cooling is increased one-third over its normal rating.

For substations under gradual load growth conditions, the *Dual-Cooled* transformer capacity bonus can defer purchase of additional units. Smaller transformers can be installed without paying for little-used standby capacity. You save on installation costs, on real estate, fencing, concrete and taxes.

Dual-Cooled transformers are available in any rating from 20,000 kva up. Contact your conveniently located A-C office or write **Allis-Chalmers,** Power Equipment Division, Milwaukee 1, Wisconsin.

A-1426

*Dual-Cooled is an Allis-Chalmers trademark



Another method of dual-cooling is the physical transfer of coolers from one transformer to the other.

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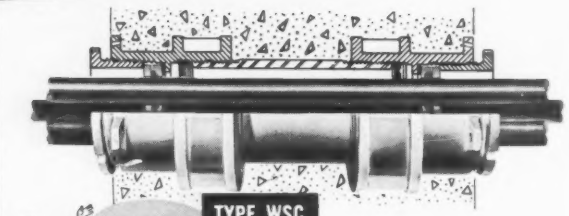
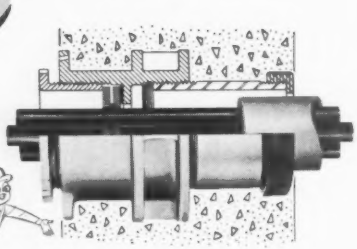
NEW! a complete line of O.Z. WATERTIGHT ENTRANCE FITTINGS for Conduit or Cable



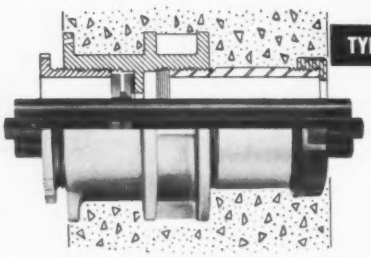
TYPE WSC

HERE'S A SEAL FOR DIRECT BURIAL CABLE.



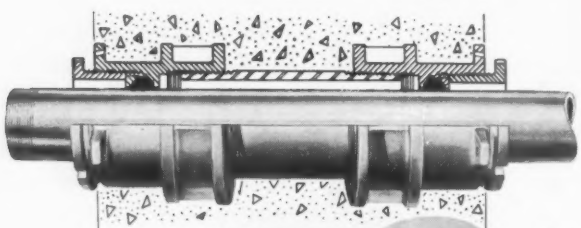
TYPE FST

HERE'S ONE FOR CABLE IN TRANSITE, FIBRE OR UNTHREADED STEEL CONDUIT.



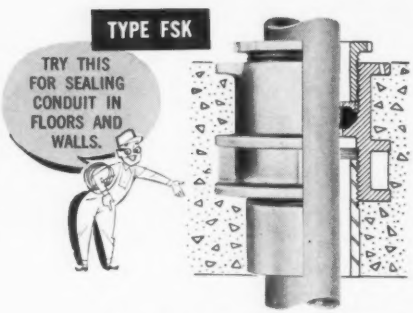
TYPE FSC

THIS ONE CAN BE USED IN FLOORS AND THINNER WALLS.



TYPE WSK

THIS ONE'S FOR CONDUIT WALL ENTRANCE SEALING.



TYPE FSK

TRY THIS FOR SEALING CONDUIT IN FLOORS AND WALLS.

End leakage problems once and for all! O.Z.'s new wall and floor entrance fittings for installation in concrete provide a positively watertight seal around conduit or cable at any pass-through point! Use them with threaded or unthreaded steel conduit, fibre or Transite® conduit, or exposed cables of varying number and sizes. Gland-type sealing assemblies, with pressure bushings, may be tightened at any time. Fittings accommodate conduit ranging from ¾" to 6". Standard types, sizes available from stock. Specials made to order.

For more information on fittings and other O.Z. products, call your local distributor, or write to the company.

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- POWER CONNECTORS
- SOLDERLESS CONNECTORS
- GROUNDING DEVICES
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- INTERLOCKED ARMOR CABLE FITTINGS

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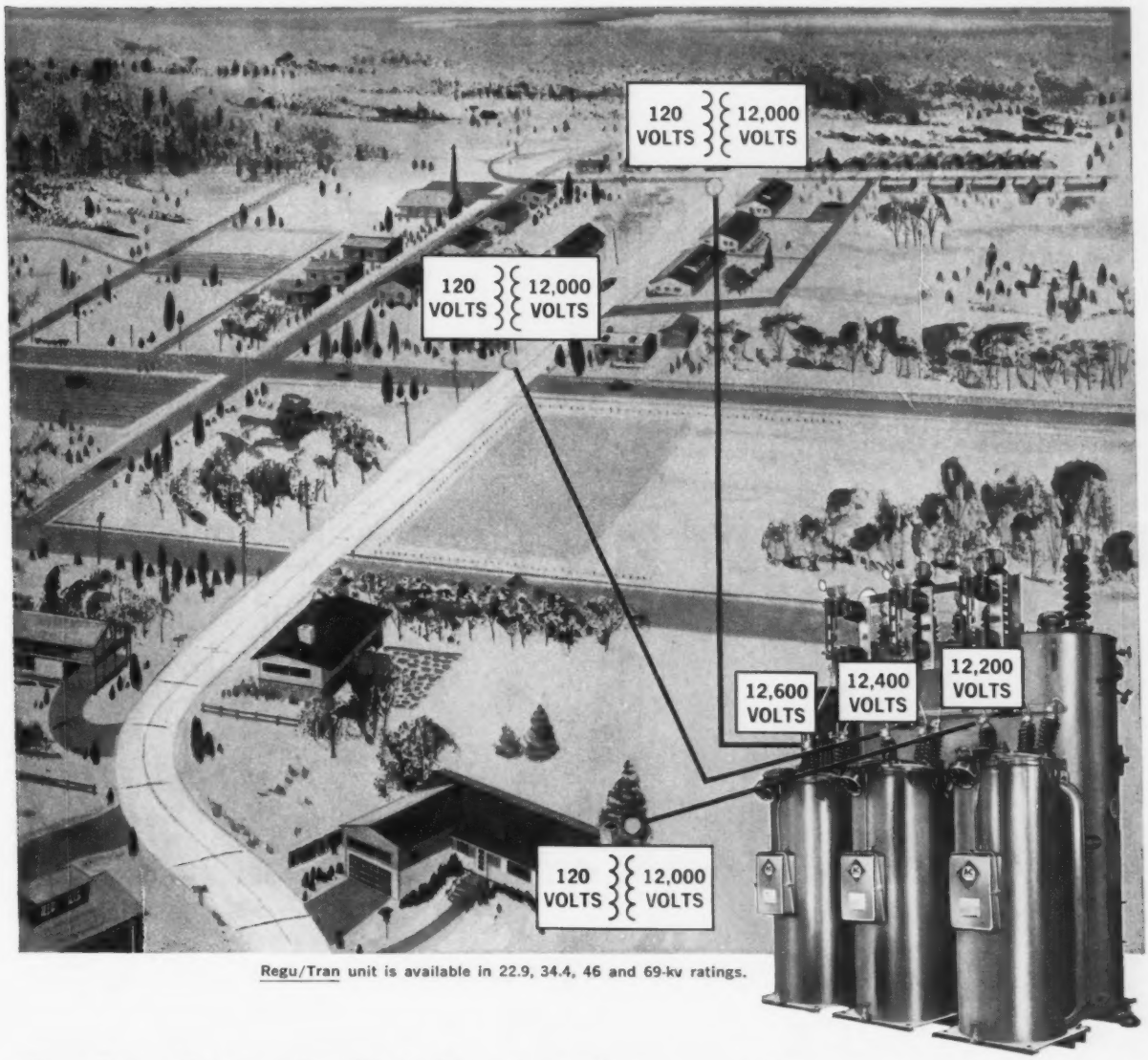
ALLIS-CHALMERS

A-1443



Regu/Tran unit is available in 22.9, 34.4, 46 and 69-kv ratings.

New Regu/Tran unit with independent phase regulation

improves voltage control, increases revenue

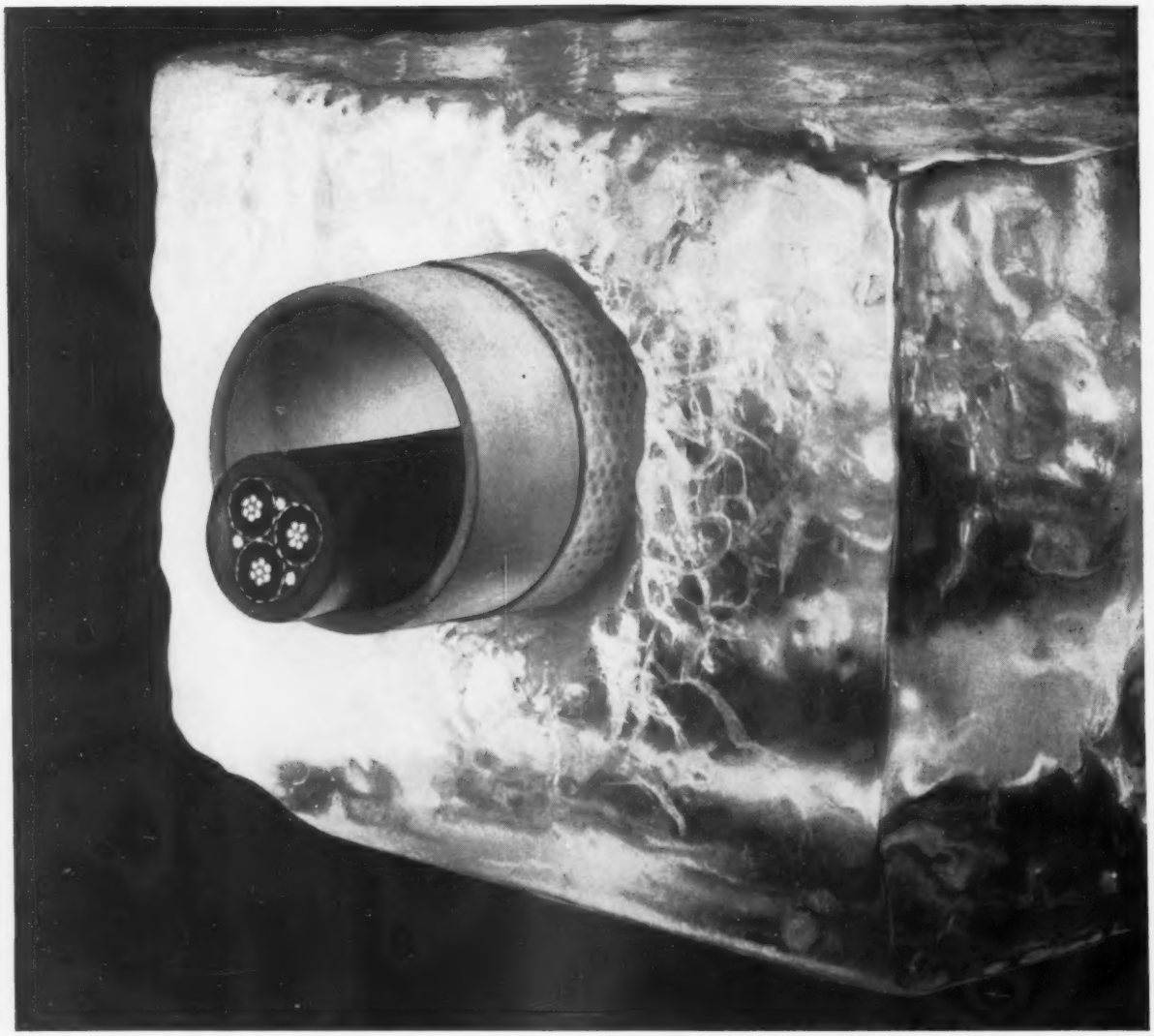
Regu/Tran units are the economical answer to the problem of unbalanced loads and varying lengths of single-phase feeders. Three single-phase regulators with famous *Feather-Touch* control are super-sensitive and responsive to voltage changes. You get 1% control accuracy and 20% range of regulation. Advantage: increased revenue, better customer relations through improved voltage regulation!

- **SAFETY** — By-pass switches when required are fully visible. Permit de-energizing regulators and control without dropping service.
- **TAILORED REGULATION** — If just ±5% regulation is needed, that's all you purchase. No need to pay for unused voltage range.
- **VERSATILITY** — Use transformer and regulators as separate units.
- **MINIMUM INVESTMENT**—Buy Regu/Tran transformer first. Add regulators, by-pass switches as you need them.

Check these additional benefits of a Regu/Tran *unit.* **Allis-Chalmers,** *Power Equipment Division, Milwaukee 1, Wisconsin.*

Regu/Tran and Feather-Touch are Allis-Chalmers trademarks.

For phone number of closest representative see advertising index in back of book.

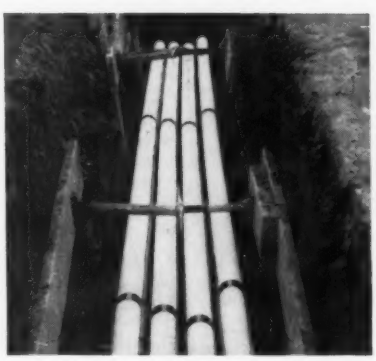


Cooler cables at lowest costs with Transite Ducts!

Do you know that electrical system losses amount to more than four hundred million dollars annually? Research shows that these losses can be drastically reduced by improving the dissipation of heat from conductors under load. The most efficient and economical way to accomplish this is with inorganic Transite® Ducts.

Tests prove that asbestos-cement Transite Ducts can actually have as much as 10.6% greater heat-carrying ability than organic ducts. This means that when a conductor is supplying a given load, its temperature will be substantially lower in Transite. These cooler cables result in lower electrical resistance with correspondingly lower I^2R losses. At a $20/KW cost, this can save you as much as $8.20 per thousand feet a year. Lower operating temperatures mean longer cable life and more reliable service, too!

Because of their 10′ lengths and speedy coupling method, Transite Ducts can be installed at the lowest cost. Get the full story by writing Johns-Manville, Box 14, EW-3, New York 16, N. Y. In Canada: Port Credit, Ontario.



JOHNS-MANVILLE

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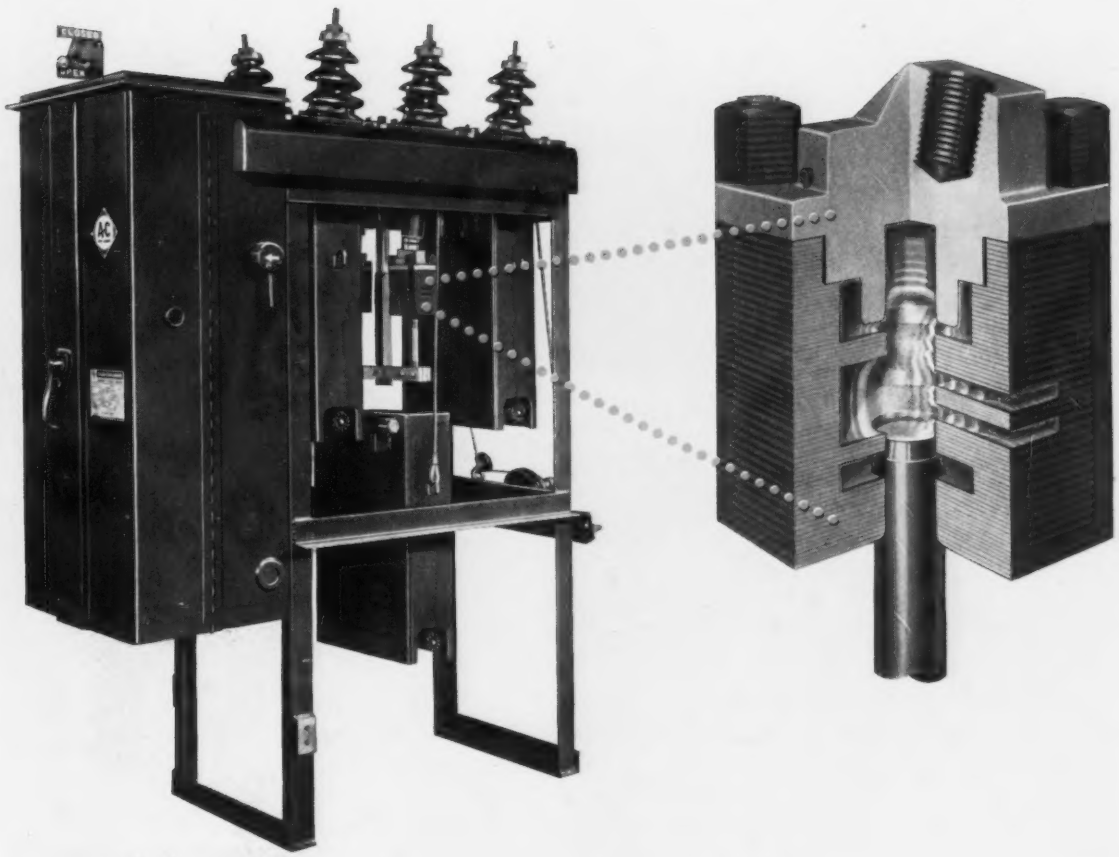
ALLIS-CHALMERS



Allis-Chalmers outdoor distribution breaker

cuts interrupting time with a cross-blast

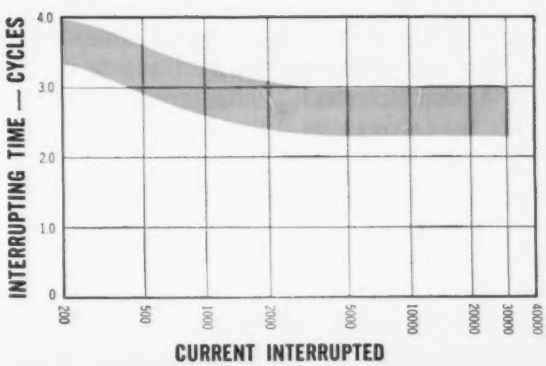
New cross-blast interrupter dramatically speeds arc extinction, sharply reduces oil contamination and maintenance in Allis-Chalmers 500-mva distribution circuit breakers. A unique gas blast literally blows out the arc.

New stored-energy operator (optional on 100, 250 and 500-mva sizes) for safe, manual or electrical, full-speed closing of breaker, even with loss of control power. (Mechanically and electrically trip-free solenoid operator is standard.)

Three-tank protection — an Allis-Chalmers exclusive — *positively* eliminates phase-to-phase flashover! Here's phase isolation comparable to rugged transmission-type breakers. No other distribution breaker compares in all-around safety, ready accessibility, ease of maintenance.

Phone your nearby A-C office for more information, or write **Allis-Chalmers,** *Power Equipment Division, Milwaukee 1, Wisconsin.*

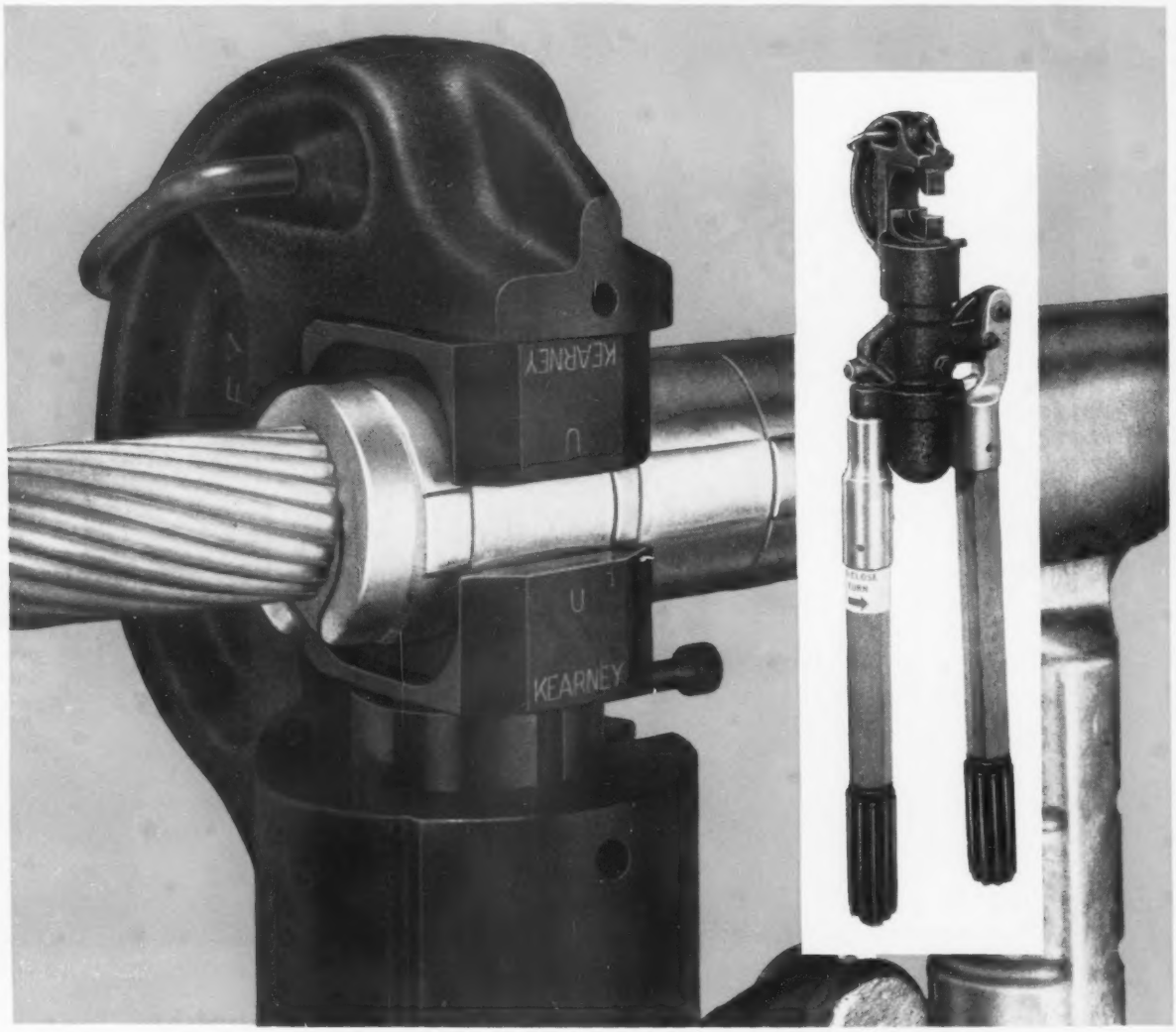
A-1367



Swift interruption over the entire range of operating currents cuts carbonization to the lowest level ever.

For phone number of closest representative see advertising index in back of book.

KEARNEY WH-2 HYDRAULIC TOOL AND



This is the tool... Kearney does it again! The Kearney WH-2 Hydraulic Tool—big brother to the WH-1 Tool—is the FIRST and ONLY portable, hand-operated, hot-line compression tool to accommodate such a wide range of fitting and conductor sizes. Equipped with only this ONE tool linemen can now install tap compression connectors on all sizes of energized and non-energized conductors from #6 Solid through 636 MCM ACSR! Die sizes are the same as those for the Kearney WH-1 Tool, plus the additional sizes required to install the larger fittings shown on the opposite page. Dies snap in or out easily . . . can be secured with a set-screw. A two-step, high speed pump generates full 21,000 pounds of thrust. An automatic overload valve prevents over-compression. Large C-frame head allows clear view of work area while making indents. A partial rotation of one handle sets tool to compress or retract dies—no need to remove either hand from handles. Interchangeable insulated handles are available in various lengths to adapt tool to individual voltage requirements.

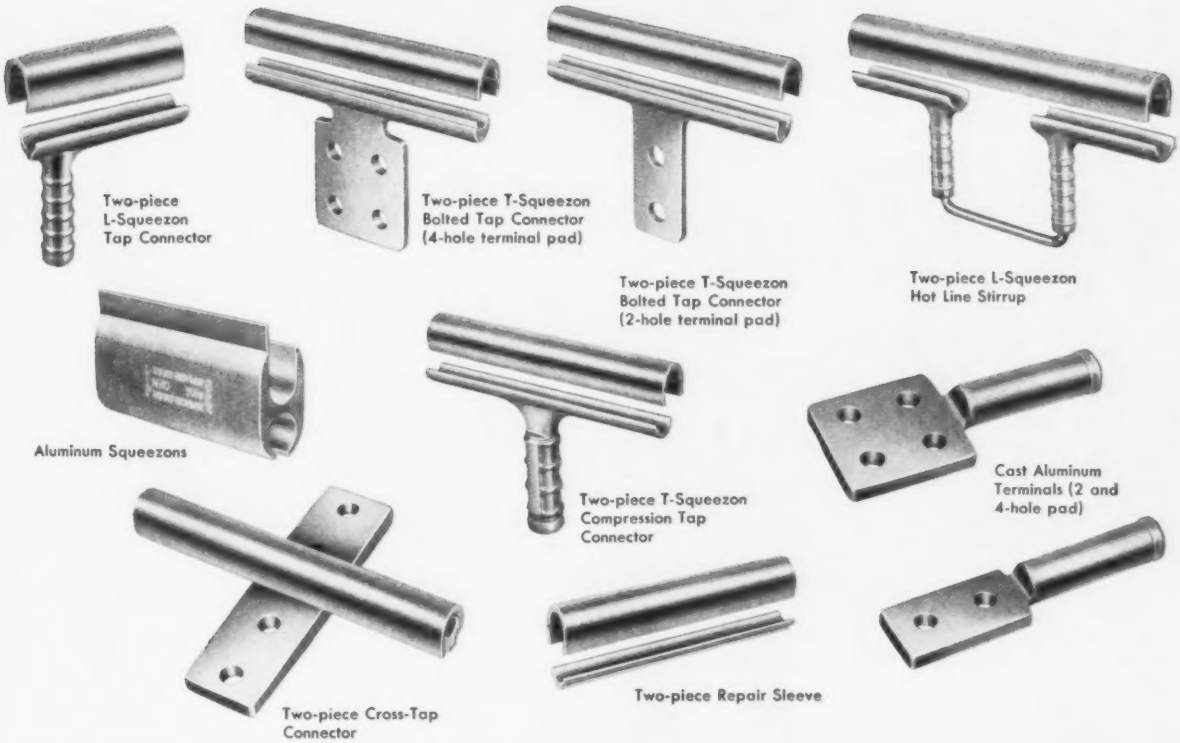
In the West: For further information, contact your Kearney West Coast Distributor
MAYDWELL & HARTZELL, INC., Los Angeles, Portland, San Francisco, Seattle, Spokane, Phoenix

509

PLANTS AT: ST. LOUIS • FAYETTEVILLE, ARKANSAS • SHENANDOAH, IOWA

2-PIECE COMPRESSION CONNECTORS

. . . extend the connection range to include installations on all "Hot" or "Cold" lines from #6 Solid to 636 MCM ACSR


Two-piece L-Squeezon Tap Connector
Two-piece T-Squeezon Bolted Tap Connector (4-hole terminal pad)
Two-piece T-Squeezon Bolted Tap Connector (2-hole terminal pad)
Two-piece L-Squeezon Hot Line Stirrup
Aluminum Squeezons
Two-piece T-Squeezon Compression Tap Connector
Cast Aluminum Terminals (2 and 4-hole pad)
Two-piece Cross-Tap Connector
Two-piece Repair Sleeve

These are the fittings . . . New, larger Kearney tap connectors and the Kearney WH-2 Hydraulic Tool now extend the tap compression connection range to include installations of highest electrical efficiency on energized or non-energized conductors as large as 636 MCM ACSR. Kearney two-piece aluminum tap connectors accommodate large conductor sizes from 266.8 MCM through 636 MCM ACSR. Tap units slide into and interlock with an encircling sleeve unit. Sleeve for any one conductor size will accept interchangeably various tap units of the same size range. Kearney interlock design aids installation . . . insures uniform compression and full-circumference contact . . . eliminates strand cutting. Sufficient connector mass without excess weight assures cool-running connections. Interchangeability of tap units helps reduce storekeeper inventories.

Also illustrated: Kearney Cast Aluminum Terminals, accommodating wire sizes from #2 ACSR to 1000 MCM Str.; Aluminum Squeezons for wire sizes from #6 Solid to 397.5, line or tap.

KEARNEY

JAMES R. KEARNEY CORPORATION

4224-42 Clayton Avenue, St. Louis 10, Missouri

CLARINDA, IOWA • GUELPH, ONTARIO, CANADA • ST. THERESE, QUEBEC, CANADA

YOU GET

LONG-LASTING PROTECTION FOR YOUR OVERHEAD SYSTEM

with

BLACKBURN *Grounding* DEVICES

Type GTC 1
One plate tower ground clamp

Type GTC 2
Two plate tower ground clamp

Copper Bonded Pigtail

Type GUV
U-bolt ground clamp parallel or 90°

Steel Driving Stud
for Sectional Ground Rods

Type GG
Ground Rod Clamp
Socket set screw

Copper Alloy Coupling
for Sectional Ground Rods

Copper Bonded Sectional Ground Rods

Copper Bonded Regular Ground Rods

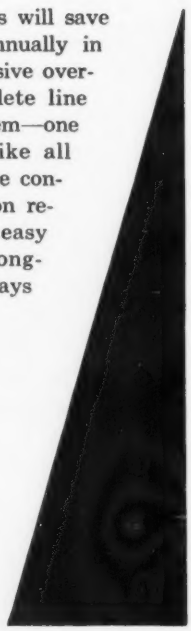
Type GGH
Ground Rod Clamp
Square head bolt

Type B
Budget Line Ground Rod Clamp
Square head bolt

Type GP 100
Electrolytic Copper Pole Bottom Plates
7½", 10", 14" dia.

Blackburn grounding devices will save you thousands of dollars annually in preventing burnouts of expensive overhead equipment. This complete line simplifies your stocking problem—one source for all your needs. Like all BLACKBURN products they are constructed of high-strength corrosion resistant materials—designed for easy installation and engineered for long-lasting, trouble-free grounding. Always specify BLACKBURN.

Available Through Electrical Wholesalers Everywhere



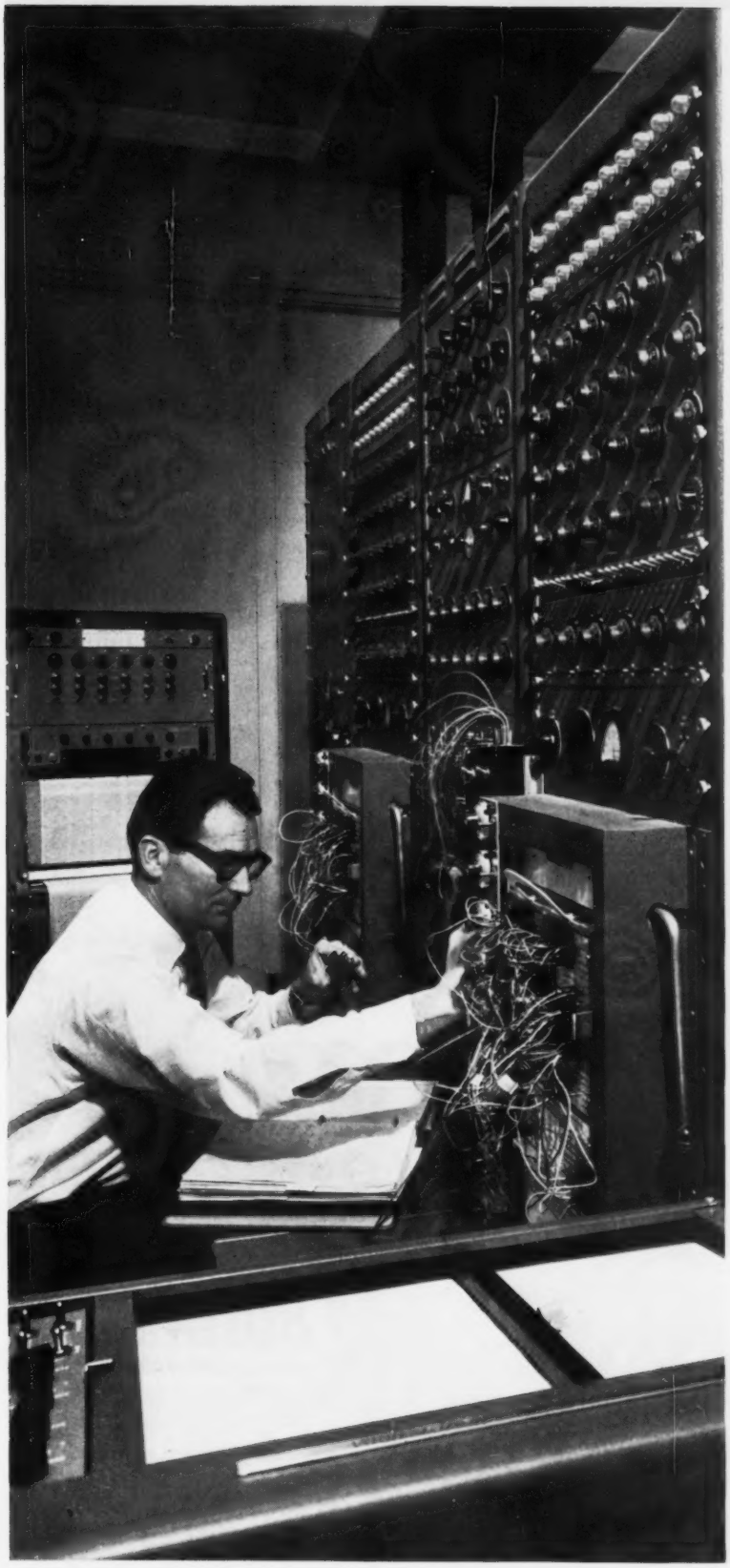
JASPER BLACKBURN CORPORATION

ST. LOUIS 14, MO.. WYDOWN 3-9430

1525 WOODSON RD.

For phone number of closest representative see advertising index in back of book.

ANOTHER STEP AHEAD IN VOLTAGE REGULATION



COMPUTER STUDIES BY GENERAL ELECTRIC PROVE . . .

Reduced Regulator Bandwidths Increase System Earnings

General Electric voltage regulators provide three added benefits to distribution systems through bandwidth reduction . . . extra feeder length, capacity, and revenue! New General Electric computer studies now prove that *reduced regulator bandwidths are practical* and that they result in increased distribution system performance with *no sacrifice of regulator life.*

Electric utilities have long recognized the desirability of bandwidths as low as ±¾ volts. The assumed stumbling block was the number of regulator operations. Through analysis of actual (as opposed to theoretical) data, new General Electric computer studies indicate that bandwidths of ±¾ volts are feasible from any standpoint, including that of equipment life.

Your General Electric regulator representative can show you the specific effects on regulator operation as bandwidths are reduced. He will show you how to determine if operations must be controlled . . . and if so, how to control them. Increase the return on your regulator investment, possibly with your existing equipment.

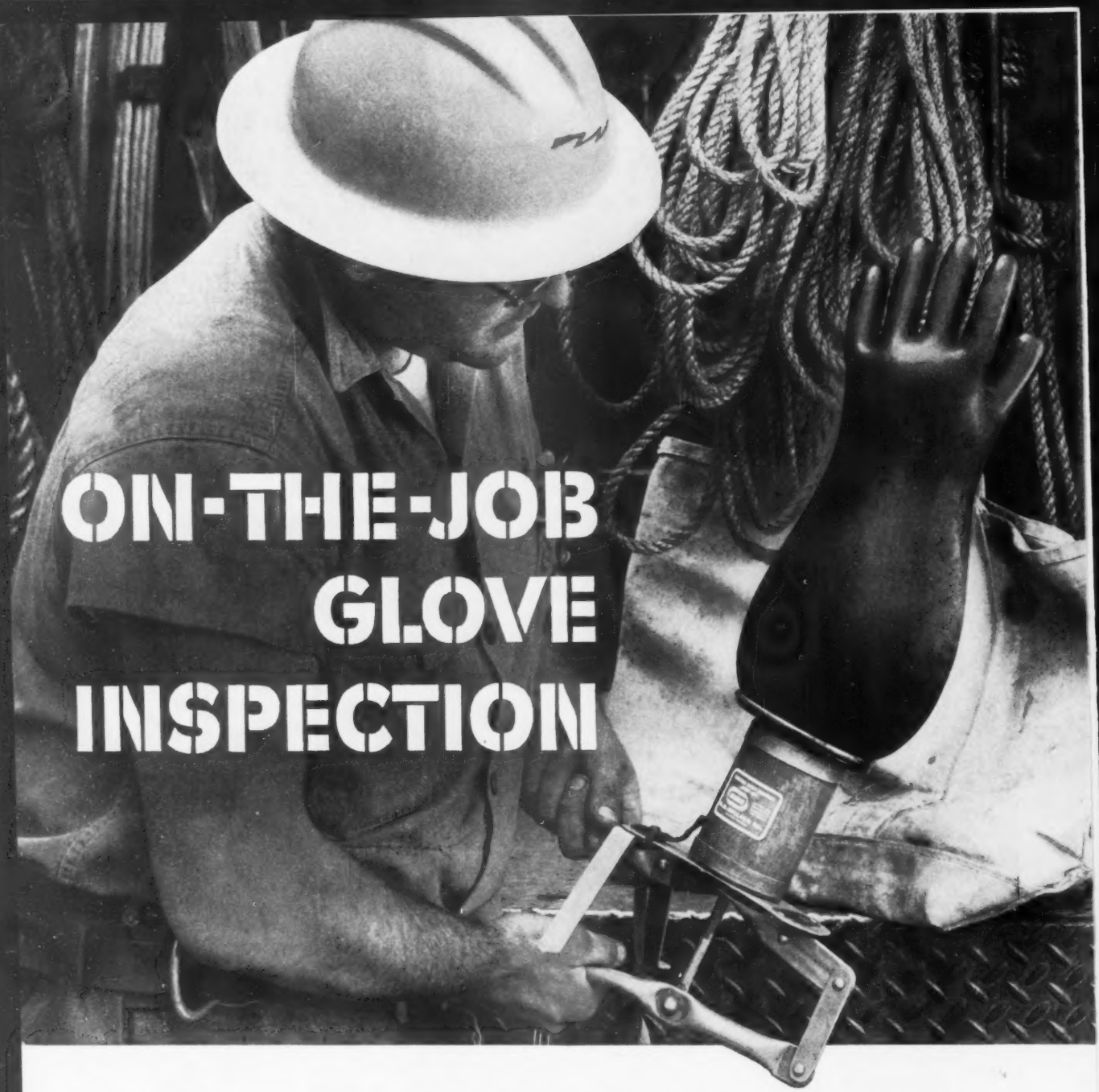
Take full advantage of the important benefits of General Electric ML-32 step regulators. Reduced bandwidths provide more *usable* kva on the line . . . permit increased loading of existing feeders. This easily attainable "power adder" can mean increased line length and capacity—important tools to reduce or defer investment. Reduced bandwidth settings make significant contributions to feeder revenue, too!

And contact your General Electric sales engineer for even more reasons why General Electric regulators cost less on the line! General Electric Company, Schenectady 5, N. Y. 456-02

Progress Is Our Most Important Product

GENERAL ELECTRIC

For phone number of closest representative see advertising index in back of book.



NEW/MATIC PORTABLE GLOVE TESTER

Test linemen's gloves immediately, efficiently, **anywhere** with the new Bullard lightweight NEW/MATIC Tester! So compact and economical that it can be standard equipment on every line truck.

Now—any time or any place—linemen can **daily double-check** the airtight safety of their gloves with just a few strokes of the pump. The Bullard NEW/MATIC Tester is available in two sizes: Catalog No. GT-A for glove size 9 with 14″, 16″ or 18″ gauntlet, and glove size 10 with 14″ or 16″ gauntlet; Catalog No. GT-B for glove size 10 with 18″ gauntlet, and glove size 11 with 14″, 16″ or 18″ gauntlet.

BULLARD
INDUSTRIAL SAFETY EQUIPMENT

Call your Bullard Distributor today for full details and demonstration . . . or write

E. D. BULLARD COMPANY
SAUSALITO • CALIFORNIA
6719 SOUTH FIGUEROA, LOS ANGELES

TEST GLOVES DAILY FOR CRACKS • TEARS • PUNCTURES

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GET INTO ORBIT with...

SHAWMUT'S

all new
silver plated

ONE-TIME FUSE

LOOK FOR **SHAWMUT'S *ALL NEW* ONE-TIME** — The fuse that makes all other One-Times obsolete. Provides *modern* protection for either old or new power circuits. Ask for Bulletin O-T 601.

Les Maintenance says:
SHAWMUT'S® All New One-Time FUSES can't be beat because they...

1. Give predictable performance.
2. Run 38% cooler in switches and enclosures.
3. Give up to 700% more Time Delay.
4. Meet all Federal specs. for One-Time and Time Delay fuses.
5. Exceed all industry standards for One-Times.
6. Are U. L. Approved.
7. Save power through low watt loss.
8. Are the only tested and proven AC-rated One-Times, Shawmut's New One-Times can pay for themselves through power savings alone.

Write for Bulletin O-T 601 today.

THE **CHASE-SHAWMUT CO.**
374 MERRIMAC ST., NEWBURYPORT, MASS.
SUBSIDIARY OF I-T-E CIRCUIT BREAKER CO.

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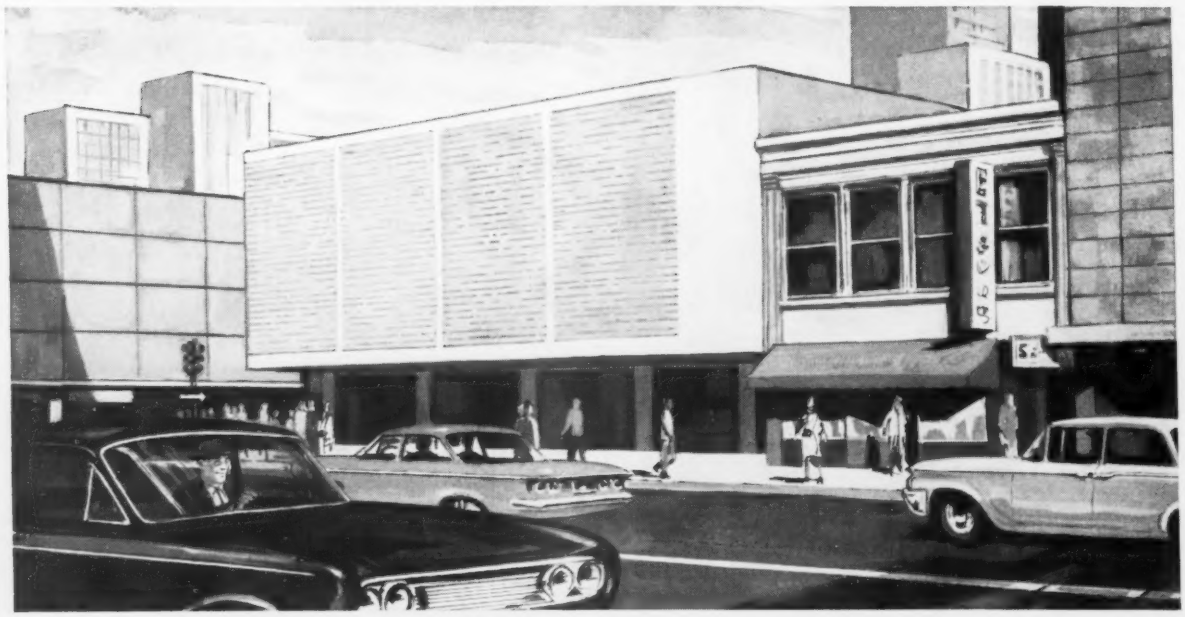
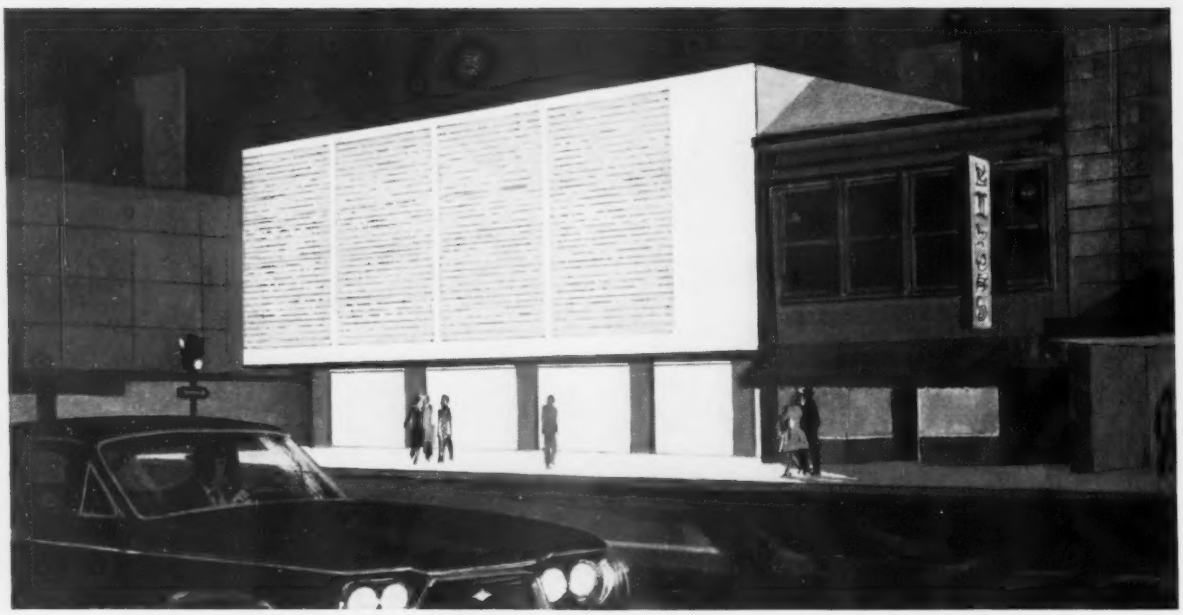
JUST ANOTHER BUILDING IN THE DAYTIME



BUT A LANDMARK AT NIGHT



WITH DRAMATIC FLOOD-LIGHTING!

Advertising: Exterior night-lighting dramatizes your building and keeps "selling" your business after hours.

Prestige: Your lighted building enhances its place in the community, brightens your public image.

Safety: Flood-lighting helps protect your property from theft and vandalism, cuts down night accidents.

Economy: Exterior lighting is an inexpensive, modern way to advertise. It's easily installed ...usually without rewiring. Ask a PG&E lighting representative for free consultation.

PG&E Service is your best bargain

P·G and E·

Pacific Gas and Electric Company

P·G·E·

On August 31, 1954, a group of New England

NEW ENGLAND ELECTRIC SYSTEM

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE

EASTERN UTILITIES ASSOCIATES

CENTRAL VERMONT Public Service CORPORATION

WESTERN MASSACHUSETTS Electric COMPANY

NEGEA NEW ENGLAND GAS AND ELECTRIC ASSOCIATION

THE HARTFORD ELECTRIC LIGHT COMPANY

CENTRAL MAINE POWER

BOSTON EDISON COMPANY

C L&P THE CONNECTICUT LIGHT AND POWER COMPANY

utilities formed the YANKEE ATOMIC

Electric Company, a cooperative venture

designed to give each utility experience in

The reactor selected:

The core in Yankee's reactor is rated initially at 110,000 kwe net, to be raised later to the plant's full rating of 136,000 kwe net. Fuel consists of 3,470,000 enriched uranium dioxide pellets weighing 52,190 lb. Westinghouse furnished Yankee with a complete nuclear package — fuel assemblies, "canned" motor-pumps, instrumentation and controls, valves, control rod drive mechanisms and steam generators.

using nuclear power.

a Westinghouse closed cycle water reactor.

Westinghouse and Stone & Webster Engineering Cor

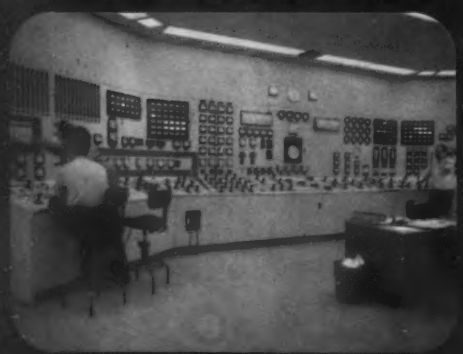
design and plant construction at Rowe, Massachuse

2000-acre site. On April 24, 1959, the first major ele

delivered. On February 7, 1960, the 165-ton reactor v

On November 10, the plant delivered its first energy

Yankee's 1800-rpm, 60-cycle Westinghouse steam turbine generator is rated at 160 mva. Yankee is a base load plant and will represent about two percent of New England's installed capacity. By training personnel in the operation of a full-scale atomic power plant now, participating utilities will be able to take quick advantage of anticipated technological advances and economics as knowledge and experience grow.



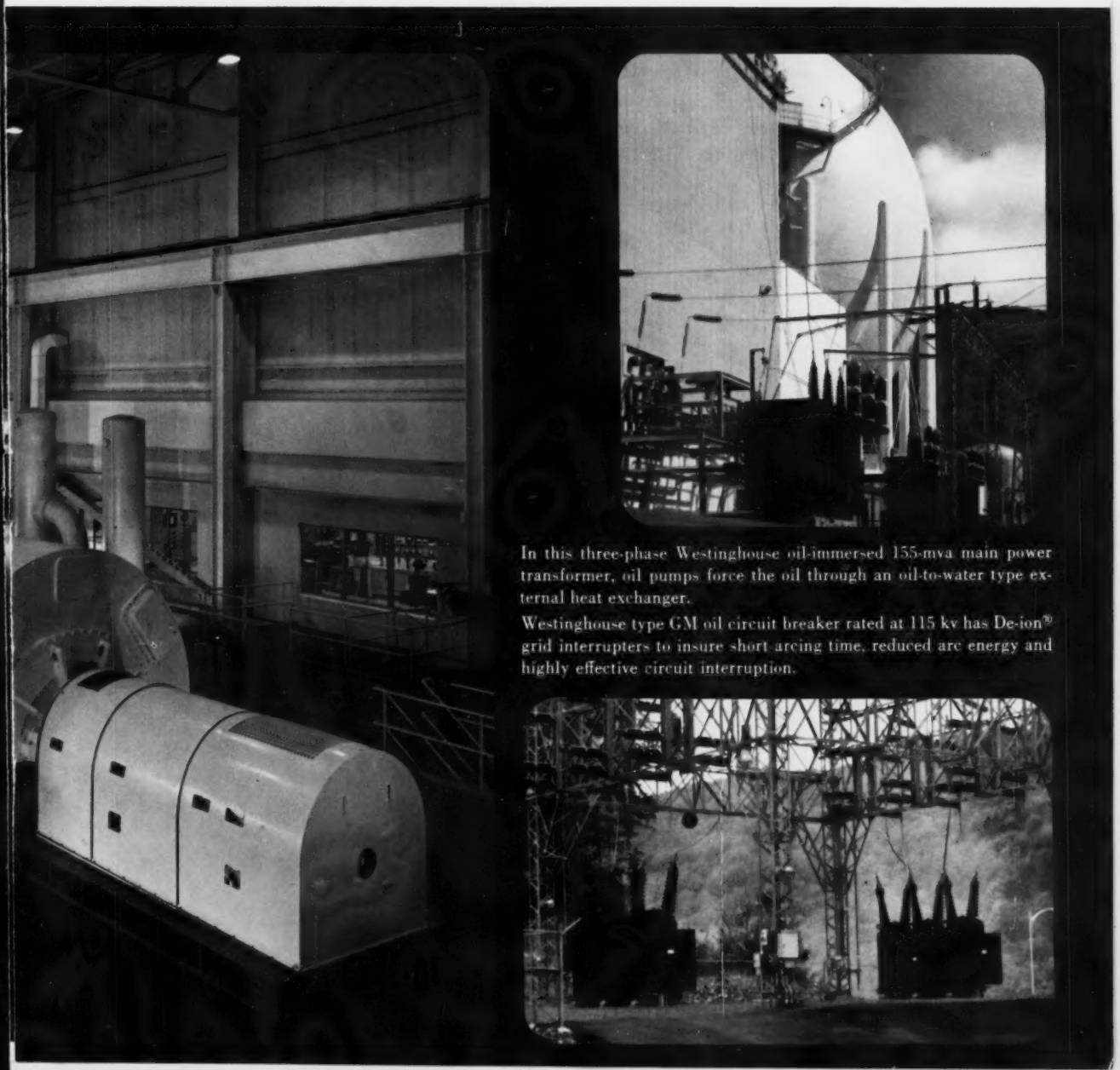
poration were authorized to proceed on engineering

ts. On March 17, 1958, excavation was begun at the

ctrical equipment—the 160-ton generator stator—was

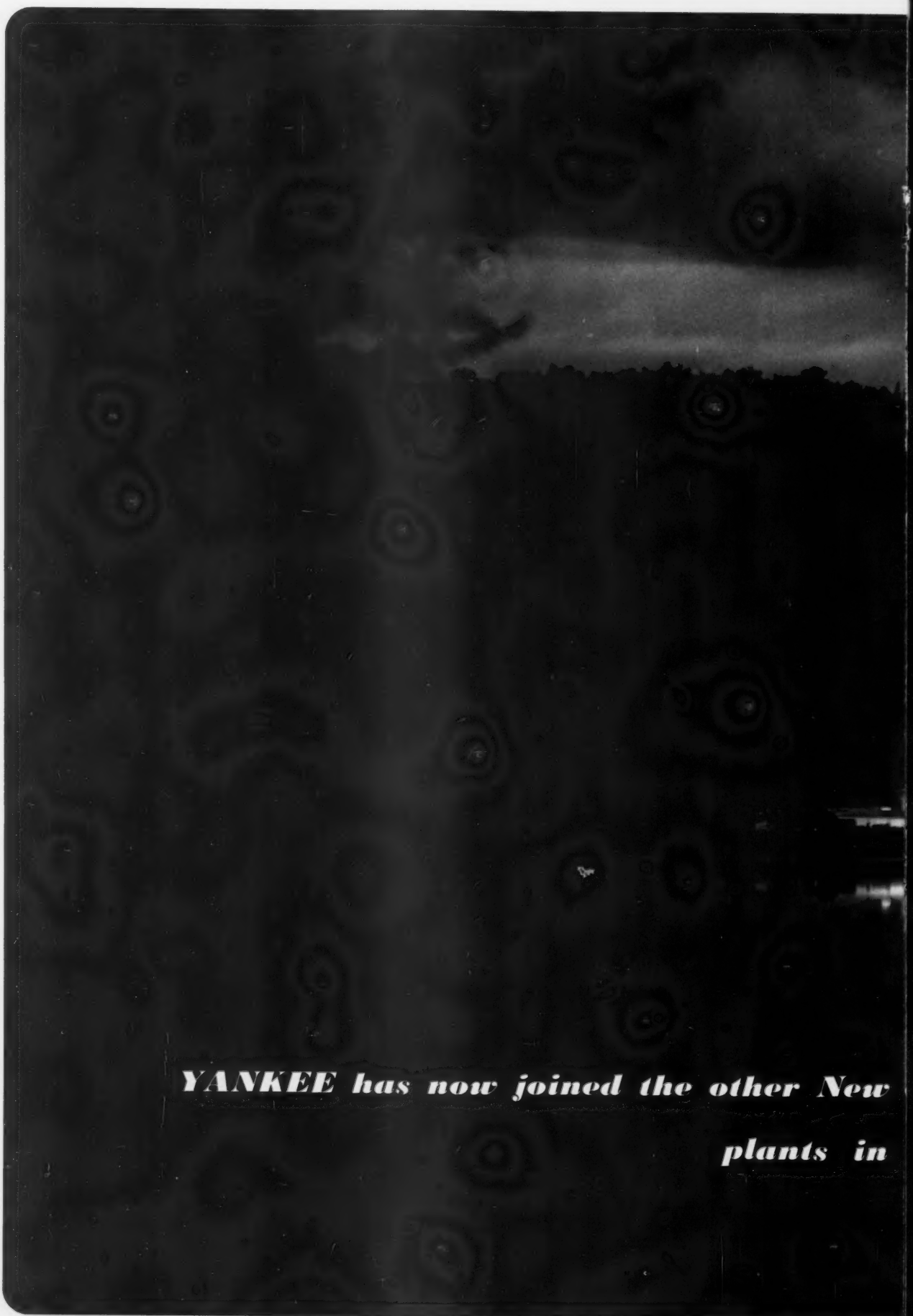
essel arrived. On August 19, the reactor went critical.

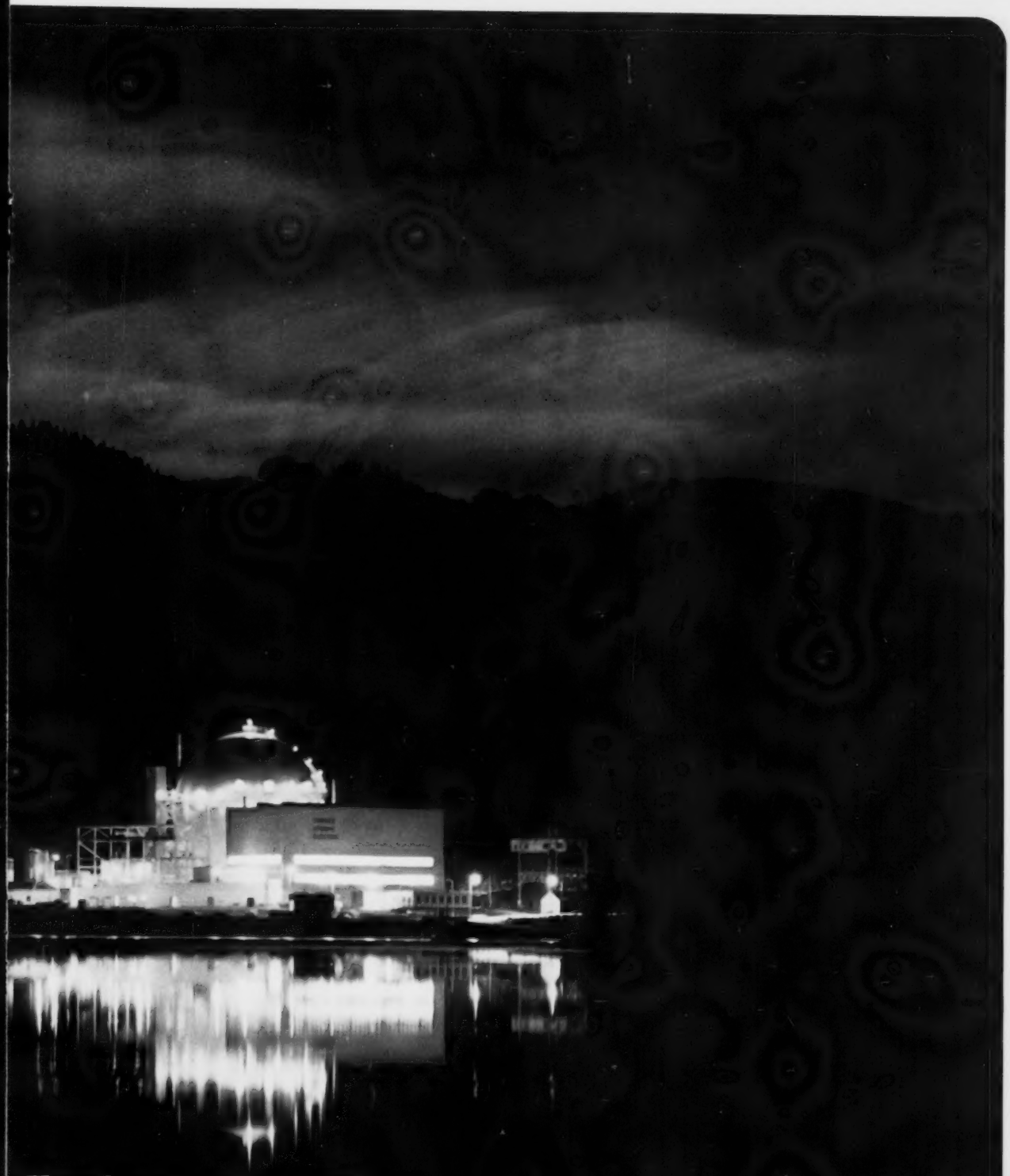
to New England's integrated electric power system.



In this three-phase Westinghouse oil-immersed 155-mva main power transformer, oil pumps force the oil through an oil-to-water type external heat exchanger.

Westinghouse type GM oil circuit breaker rated at 115 kv has De-ion® grid interrupters to insure short arcing time, reduced arc energy and highly effective circuit interruption.


YANKEE has now joined the other New
plants in



England generating

supplying the region's electrical needs.

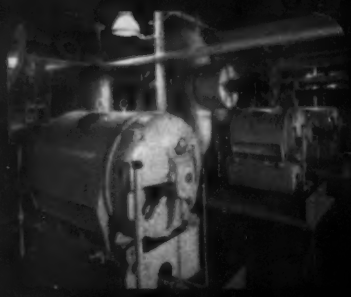
In atomic power, too, you can

be sure . . . if it's Westinghouse.

Westinghouse has also provided:

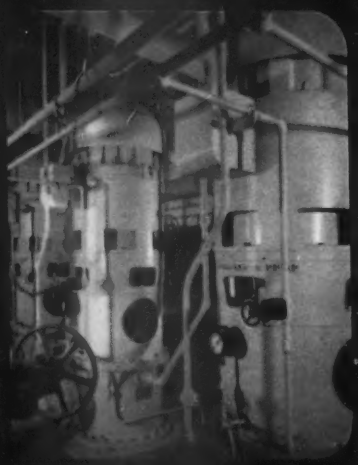
condensers

switches



motors

switchgear



pumps

dry-type transformers

and . . .

power centers, motor control centers, distribution panels, potential devices, elevator, relays, instruments, lightning arresters, fans and blowers.

CP-1061
FILE NO.-EU

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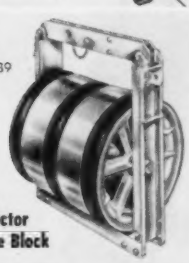
where you find... TRANSMISSION DISTRIBUTION *you'll find S&R...*

CONDUCTOR STRINGING BLOCKS

Helicoptor Blocks
Both suspension and crossarm types available.

No. 7020
Two Conductor Bundle Block
with S&R's exclusive unidirectional articulated running board.



No. 7039
Three Conductor Bundle Block

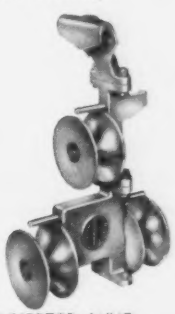
Permanently Bonded Type GNA Neoprene Sheave Lining
Vulcanized in place. Available on all sizes 7 thru 28.

S & R MODEL XS-100
UNIVERSAL
Stringing Block with Adjustable Crossarm Bracket
The most versatile block ever made

On Crossarm

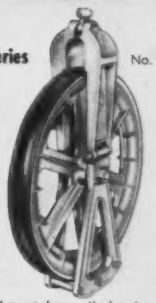
In Suspension

Model MH-303
SPACER TYPE AERIAL CABLE STRINGING BLOCK
Aluminum throughout. Sheaves on anti-friction ball bearings.



USE SAME BLOCK FOR DIAMOND . . . OR . . . INVERTED WYE

78 Series No. 7832



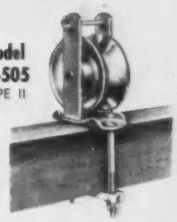
Lightweight... all aluminum alloy construction. Sizes 20 thru 28 for conductors thru 1,780,000 C.M.

73 Series
No. 7332

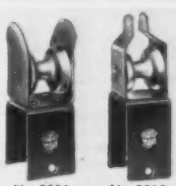
Widened Throat Safety Locking Type

All aluminum. Particularly useful for re-conductoring. Available sizes 7 thru 16 for conductors thru 1,272,000 C.M.

Model XS-505 TYPE II



7" O.D. Sheave with anti-friction ball bearings mounted in steel frame.



No. 9811 No. 9812
Crossarm Rollers

Sherman & Reilly, Inc.

ENGINEERS AND MANUFACTURERS
First and Broad Streets
Chattanooga 2, Tennessee
Telephone AMherst 7-1273

In Canada: A. B. Chance Co. of Canada, Ltd.
Box 10, Toronto 13, Canada

NEW 1961 Catalog
On Request

Mail coupon for new catalog

Sherman & Reilly, Inc., 1st and Broad Streets, Chattanooga 2, Tenn.
Please send the new S&R complete catalog of conductor stringing equipment.

NAME_____ POS._____
COMPANY_____
ADDRESS_____

For phone number of closest representative see advertising index in back of book.

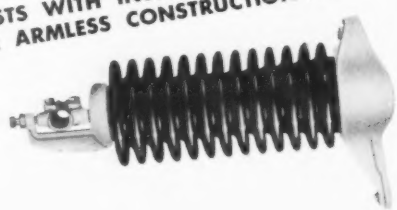
CLAMP

THE LAPP CLAMP IS INTERCHANGEABLE

Five sizes of clamps, in aluminum or malleable, each with reversible keeper, provide correct fit for all conductor sizes .25″ to 2.00″ dia. All clamps are interchangeable for use on

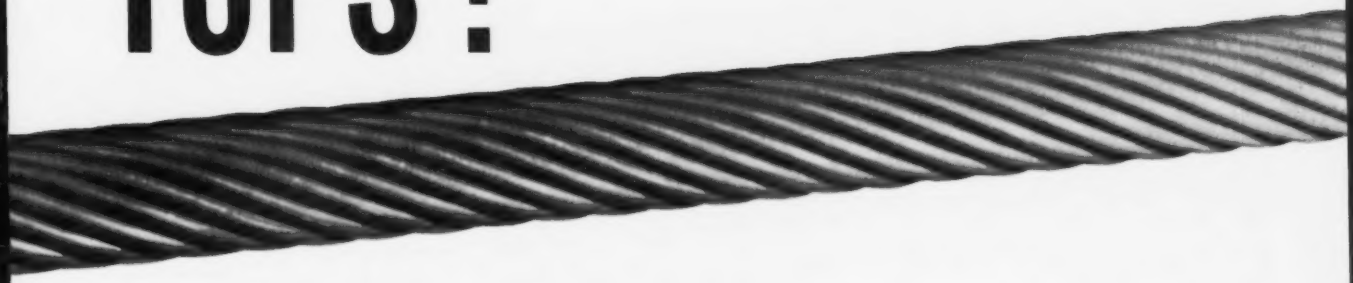
CLAMP-TOP LINE POSTS . . .

CLAMP-TOP LINE POSTS WITH INTEGRAL BASE-AND-GAIN FOR ARMLESS CONSTRUCTION . . .



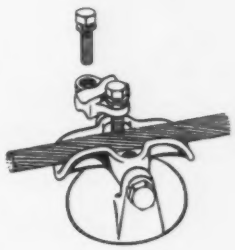
CLAMP-TOP GROUND-WIRE BRACKETS

-TOPS?



THE LAPP CLAMP IS EASIEST TO INSTALL

For original installation, insulator (or bracket) with clamp attached, is mounted to crossarm or pole. Keeper cap screws are loosened, and one removed. With keeper rotated out of position on remaining cap screw, conductor is dropped into place. Keeper is brought back to position, cap screw replaced, and both cap screws tightened. Cap screws have captive lock-washers so there is *only one loose part* per insulator throughout installation.

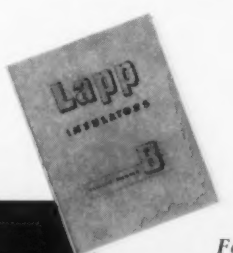


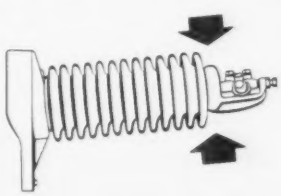
THE LAPP CLAMP IS EASIEST TO WORK WITH HOT-LINE TOOLS

No special tools required for insulator change-out. A trunnion cap screw is merely backed off, and conductor (with clamp attached) lifted out of position. The same clamp will slip into position in a replaced insulator and be secured by tightening trunnion cap screw. *No loose parts* throughout insulator change.

THE LAPP CLAMP-TOP IS MOST DEPENDABLE

A principle of Lapp Post design is the *external* attachment of hardware—*bases and caps.* This assures that the porcelain body be loaded only in large-area low-intensity compression. This design takes full advantage of porcelain's superior compression strength, and provides an assembly greatly more secure than one subject to the high-intensity tension loading introduced by internal pins and inserts.





Lapp

For new ideas on economical, efficient line and station construction read the new Lapp Catalog Eight. For your copy, write Lapp Insulator Co., Inc., Le Roy, N. Y.

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NEWS

Edited for the electrical industry of the West

Exemption Bid Fails

The city of Tacoma appears to have failed in its attempt to have the Washington state legislature exempt its Cowlitz River hydroelectric development from provisions of an initiative, approved in last November's state-wide general election, which bars construction of power dams on the Cowlitz and other tributaries of the lower Columbia.

The proposal lost by a margin of three votes Feb. 7. There are indications, however, that Tacoma is not overwhelmed by the legislative defeat. Observers point out that nothing probably can be done to halt the construction of Mayfield Dam, now 70% complete, and that there is really no hurry in going ahead with Mossyrock Dam.

The two-thirds majority required to amend the initiative at this session of the legislature will be reduced to a simple majority in the 1963 session, and this will be much easier to obtain. Neither the state nor city is inclined to bring the matter to court and sportsmen's groups are restrained in their eagerness by the knowledge that the city will insist on the posting of a large bond to protect its $22 million investment in the Cowlitz project, plus another $13 million that has been committed.

Before the Oregon Legislature

A bill introduced in the Oregon legislature would permit PUDs to disregard legal requirement for competitive bidding in purchase of technical equipment for which standardization and interchangeability of parts are necessary and cannot be satisfactorily achieved except by procurement through negotiations.

Under another bill the office of State Engineer, the Oregon Water Resources Board and the Oregon Hydroelectric Commission would be abolished and their duties and functions transferred to a Water Resources Division of a new Department of Natural Resources. The measure is part of a governmental reorganization program advocated by Gov. Mark Hatfield. The three agencies now frequently overlap in function.

Legislation that would authorize the state engineer to control the release of water from hydroelectric dams "on a finding of danger to human life" has been introduced in the legislature. Sponsors said the bill is aimed particularly at the Clackamas River, site of several Portland General Electric Co. dams. Two drownings since 1958 have been blamed on rapidly rising waters of the stream.

Oregon PUDs would no longer have to have approval of district voters to issue revenue bonds by terms of a bill introduced.

Municipals Exempted

The Wyoming House and Senate have passed a bill to exempt municipally owned electric plants from jurisdiction of the state PSC.

The state supreme court had ruled a year ago that, under the present law, the PSC had jurisdiction to control the rate making and other jurisdiction over municipally owned power plants.

Thirteen Wyoming cities and towns, which own their own electric plants, had fought the battle in the courts for two years before losing before the state supreme court.

Plant for Anchorage

The Anchorage City Council has accepted the recommendation of R. W. Beck & Associates, Seattle consulting engineers, that its proposed 6,500-kw natural gas turbine plant be located within the city. It previously had been considering a proposal to locate the $2,000,000 plant near Standard Oil Co. gas-producing properties on the Kenai Peninsula.

The council directed Roy Samson, manager of the city's electrical department, to seek proposals on engineering services for design of the plant and to secure standardized plans from domestic manufacturers of gas turbines.

Average per-kilowatt cost of power to the city from the new plant is estimated at 12.38 mills.

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Entitled to Serve

Colorado Public Utilities Commission ruled that Gunnison County Electric Assn., an REA, was entitled to serve wide areas in Gunnison and Hinsdale Counties.

The PUC rejected a demand by Western Colorado Power Co., a subsidiary of Utah Power & Light Co., that it also have the right to serve the territory. The PUC said the power company's proposal was "tantamount to a request for a right to invade, contrary to the tenor and holdings of the (Colorado) Supreme Court."

The PUC order, unanimously approved by the three-member commission, excluded from the REA's territory areas now served by the Public Service Co. of Colorado, the Gunnison municipal electric system and the Delta-Montrose Power Assn., another REA.

Fees for PSC Business

The Wyoming Senate has passed a bill raising the fees charged for filing applications and other business coming before the Wyoming PSC. The bill will increase from $1 to $5 the fee for filing applications and permits, $5 to $15 the fee for certificates of convenience and necessity, $1 to $5 the fee for filing applications for amendment or assignment of certificate of convenience and necessity, $2 to $5 the fee for filing contests, $1 to $2 for each certificate and seal and several other small increases. The bill also adds a new fee of $15 for filing petitions of application for PSC approval of proposed issue of securities.

Squatters Face Power Shutoff

In days of the Old West, you got rid of squatters by shutting their water off. Today it's power.

Seven of the commercial squatters along the Colorado River between Parker and Parker Dam have been mailed warnings that the U. S. Bureau of Indian Affairs will cut off their electric power in 30 days. Later to be affected are 108 residential and 21 commercial squatters in the area.

The warnings amount to the Eisenhower Administration's parting shot at some of the 900 trespassers who have been occupying government-owned land lying along the river from Parker to the Mexican

border. The Justice Department already has filed eviction suits against some of the squatters in federal courts in Arizona and Colorado.

The squatters are served by Indian Bureau lines erected initially to operate the reservation irrigation system with power generated at Parker Dam. Many of them have occupied the land without claim to title since construction of Parker Dam. The Indian Bureau began giving them electric service during a period when it appeared there was possibility they would attain legal right to the land.

Merger Details

Boards of directors of Pacific Power & Light and California Oregon Power companies have announced adoption of a detailed agreement covering the proposed merger of Copco into Pacific and set March 14 as the date for special meetings of stockholders to act on the plan. PP&L's meeting will be held in Portland and Copco's in Medford.

By earlier action, the two boards had agreed to base the merger on an exchange ratio of 1.2 shares of PP&L common stock for each share of Copco common. Terms for the exchange of Copco preferred stocks into shares of Pacific have been announced.

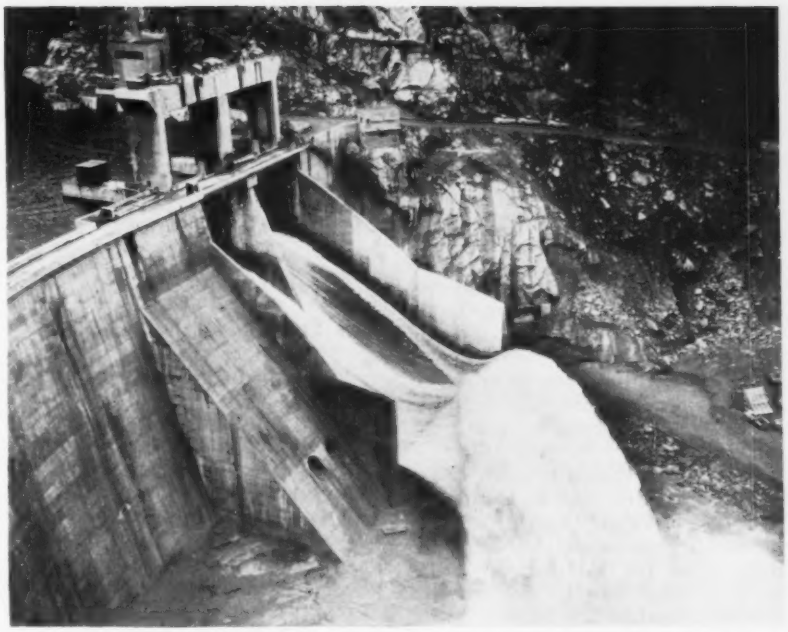
Holders of Copco's $100 par value noncallable 7% and 6% preferred stocks would receive respectively share for share of a new series of Pacific's $100 par value noncallable 7% or 6% serial preferred stock.

Holders of Copco's $100 par value 4.7% series preferred stock would receive for each share one share of a new series of Pacific's $100 par value 5% serial preferred stock; and holders of Copco's $100 par value 5.1% series preferred stock would receive for each share one share of a new series of Pacific's $100 par value 5.4% serial preferred stock.

The agreement to be submitted to stockholders would authorize Pacific to issue additional shares of common and preferred stocks equal to the number of shares of each class of stock required to effect the exchange.

Before becoming effective, the merger must also be approved by the several state regulatory bodies having jurisdiction and by the Federal Power Commission.

► The Federal Power Commission has ruled that Montana Power Co. **should increase payments to Flathead Reservation Indians** by $63,375 a year to compensate them for use of their power site lands because of an additional generating unit installed in 1954. This means Montana Power must pay the Indians the additional amount retroactive to 1954 and continue to pay it in the future, which will make the total annual payment to the Indians $283,375.



A curved spillway creates an unusual waterfall at the new Gorge Dam of Seattle City Light on the Skagit River, dedicated recently. A curve was built into the spillway, in the gravity section of the dam, to keep the cascading water from eroding the river bank below the dam. The flow is "folded over" onto itself so that much of the force is dissipated before the water hits the rock-protected downstream bed of the river. Two gates, each 47 ft long and 50½ ft high, control the flow

Combine Operations

The Walla Walla district of the Corps of Engineers has combined the maintenance and operation units of McNary Dam on the Columbia River and Ice Harbor Dam on the Snake River. The dams are about 45 miles apart in eastern Washington.

The new operations unit will be under the direction of Donald R. Cox, who will serve as chief of the new multiple purpose projects group. Headquarters for the group will be at McNary. James V. Mendenhall will serve as chief of the technical section and Vincent J. Pender will be chief of the service section. Ice Harbor generators will go on the line in December. McNary has produced power since 1953.

Study Transplant

► An attempt to transplant a run of **Sockeye salmon**—lake-reared natives of British Columbia – to the lower Columbia River is under way in the joint fishery research program conducted by Pacific Power & Light Co. and the Washington State Department of Fisheries.

Court Rules Against REA

Intermountain Rural Electric Assn. of Littleton, Colo., has lost its second major legal battle with Colorado Central Power Co. U. S. District Judge Hatfield Chilson of Denver ruled Intermountain committed a breach of contract with the power company when the REA began purchasing electrical energy from the U. S. Bureau of Reclamation.

Chilson appointed Joseph Cook Jr., a Denver attorney, as an agent of the court to determine the amount of damages due. Additional hearings will be held when Cook's report is submitted.

Merger Approved by FPC

The Federal Power Commission has approved the merger of Southern Nevada Power Co. of Las Vegas and Elko Lamoille Power Co. of Elko. Southern Nevada, the surviving corporation, will exchange 1¼ shares of its common stock for each share of Elko common. It will continue to provide the services now rendered by Elko.

Court Rules Against PUC

The California State Supreme Court has dissolved a cease and desist order that had been aimed at preventing Richfield Oil from proceeding with construction of its eight-mile feeder to deliver gas to Southern California Edison's Mandalay Plant.

In an earlier decision the court had ruled that Richfield was not subject to PUC regulation simply because of its sale of gas to Edison. However, while this decision was pending, Richfield began construction of the feeder, causing the PUC to bring a second action against the oil company.

The court held that its decision in the prior case applies to the second case as well. Thus Richfield cannot be prohibited by the PUC from delivering gas through either its 20-in. Mandalay line or its 6-in. Rincon Island feeder.

Report Urges B. C. Export

Vancouver Trade Board has recommended export of B. C. hydro in a 39-page report sent to provincial and federal governments.

It urges the National Energy Board to remove restrictions against export that would lower power costs for B. C. The brief followed prediction by J. S. Shakespeare, solicitor for Peace River Power Development, that Peace power will be cheaper in Vancouver than Columbia power.

Noting B. C. has developed only 2,830,000 kw of an estimated 31,290,000 kw potential, the report claims that if B. C. were to achieve exports to U. S. of 500,000 kw at 6 mills it would produce export revenue of about $26 million. Shakespeare set export potential at $200 million a year for 10 million kw.

The attitude that exported power is difficult to recapture is "no longer valid considering differences between conditions today and those that prevailed during the early part of the century" when Canada was unable to recover some power from the U. S., it was pointed out.

Rate Agreement

Power rates of six large industrial customers, accounting for about 45% of all power sold by Tacoma City Light, will be increased 7%, retroactive to Jan. 1, 1960, under an agreement approved by the utility board.

When a general City Light increase averaging 7% was approved by the board a year ago, a 7½% surcharge was added to the contract rates paid by the six companies—American Smelting & Refining Co., Pennsalt Chemicals Corp., St. Regis Paper Co., Hooker Chemical Co., Ohio Ferry Alloys Corp. and West Tacoma Newsprint Co.

The companies objected to the surcharge as illegal and have been negotiating with the city for the past year.

Low Cost Power Not Enough

"Inducements other than low-cost power will have to be found as a basis for future industrial development of the Pacific Northwest," the University of Washington's Bureau of Business Research concludes in a report on the area's electric energy outlook.

"Increments to the existing supply of electric energy will be obtained at costs that are substantially higher than incurred for the present supply," the report declares.

Except for new heavy industry, the area will have enough electric energy to satisfy all needs through 1964 or 1965 but "plans should be formulated in the immediate future for construction of facilities needed to eliminate the deficit that will otherwise exist from that date at least through 1975," the report advises.

Jack D. Stevens, Seattle consulting engineer, was chairman of the research committee that prepared the report.

Hoover Unit Delayed

A delay of five or six months in completion of N8, the last of the power generating units at Hoover Dam on the Colorado River near Boulder City, Nev., looms as a probability because of changes in plans and other delaying factors, including the steel strike of last year, according to Lloyd J. Hudlow, project manager.

Completion of N8 was scheduled for September 1961 but probably will not take place until early 1962 under the revised schedule.

► Construction of 560,000-kw Wells Dam on the Columbia River **probably will be postponed two years** because of the U. S.-Canadian treaty on development of the river, according to John Dawson of New York, bond counsel of the Chelan County PUD, dam sponsor. The treaty will make available 1,250,000 kw of additional power, equivalent to two years' load growth in the Pacific Northwest, Dawson estimated.

6.5% Return Rescinded

B.C. Public Utilities Commission has rescinded the allowed return of 6.5% on B. C. Electric operations and has indicated that the company will be more closely regulated.

In its ruling the commission stated that in future B. C. Electric not only would have to prove that it spent so much to provide service, as it was forced to do in the past, but also would be required to show that the costs in providing such services were not excessive.

The new decision is the result of a recent ruling by the Supreme Court of Canada that the company could increase its rates as it pleased provided it stayed within the 6.5% limit. In 1943 the PUC told the utility that it was entitled to a fair and reasonable rate of return on its depreciated holdings and in 1952 this was set at 6.5%.

The new decision said the commission felt the company was entitled to earn 6.5% "if it could do so by economical and efficient management."

► **Lower electric rates** for northern Arizona commercial and industrial users will bring savings of $400,000 to more than 4,000 customers affected. Purpose of the cut is to provide incentive for increased use.

► **Schools in Chelan County** will save an estimated $11,000 annually on their light and power bills as the result of a new rate schedule instituted by the Chelan County PUD. The reduction amounts to 23%, according to Harley Bryant, the PUD's commercial manager. Under the new schedule, the first 100 kwh will cost 3.2¢ per kwh per month; the next 400, 2½¢; the next 2,500, 1½¢; and everything over 3,000 kwh 1¢.

► Pacific Gas and Electric Co. has been awarded the **American Meteorological Society's top citation to a corporation** for its "perception, imagination and leadership" in maintaining its own weather service. The award was presented to the company at the society's annual banquet at the Barbizon-Plaza Hotel in New York City. Francis J. Parsons, PG and E senior meteorologist, accepted the award on behalf of President Norman R. Sutherland. The citation points out that PG and E "was the first and is probably the only utility company in the United States that has made full use of weather facilities and information in its daily operations."

GROWTH

REA Loans Authorized

Arizona: Mohave Electric Cooperative, Kingman, $91,000 to finance construction of new headquarters facilities including purchase of site.

Trico Electric Cooperative, Tucson, $828,000 to finance construction of 60 miles of distribution line, and 25 miles of 115-kv transmission line; and to make system improvements including conversion of 29 miles of existing line.

Colorado: San Isabel Electric Assn., Pueblo, $618,000 to finance construction of 68 miles of distribution line, eight miles of 69-kv transmission line and three related substations, and nine miles of tie line; and to make system improvements including conversion of 100 miles of existing line.

Wyoming: Shoshone River Power Inc., Cody, $351,000 to finance construction of 52 miles of distribution line, 10 miles of 69-kv transmission line, and one 2,500-kva substation; and to make system improvements including conversion of 34 miles of existing line.

Flaming Gorge Power Lines

Contractors' bids will be opened Feb. 28 at the Vernal office of the USBR on two projects for transmission of electrical power from Flaming Gorge Dam to load centers in northeastern Utah and northwestern Colorado.

The lines will stretch for a distance of 210 miles from the dam site to Green Mountain switchyard located between Kremming and Dillon, Colo.

PP&L Transmission

Start of construction of three sections of 230-kv transmission line to provide a 161-mile-long route for power from Pacific Power & Light's generating plant at Glenrock to Riverton, Wyo., and then south to serve U. S. Steel's Columbia-Geneva iron ore development is scheduled for March or April.

Wasatch Line Construction Co., Salt Lake City, was awarded the 50-mile section from PP&L's substation at Riverton, south to the South Pass area. The offer was $308,134. Work is to start March 1 and be completed in 150 days.

The Casper to Riverton construction is divided into two sections with the work scheduled to begin a month later. The Casper end will be constructed by Union Power Construction Co., Denver, on a bid of $229,566. This section is approximately 55 miles long. The remaining portion on the Riverton end has been contracted to Jelco of Wyoming Inc., Casper, on its offer of $248,975.

H-frame wood pole structures will carry the three heavy duty, steel reinforced aluminum conductors (1,272 mcm ACSR). The poles for the structures vary from 75 to 90 ft in length.

USBR Acceleration

Six hundred employees in the Denver office of Grant Bloodgood, assistant commissioner and chief engineer of the Bureau of Reclamation, began working overtime Feb. 10 to carry out President Kennedy's speed-up order for reclamation projects.

Bloodgood ordered his staff to begin working 10 hours a day Monday through Friday and eight hours on Saturday. His staff ordinarily works a five-day, 40-hour week.

Bloodgood is in charge of project design, specifications and project contracts for all seven of the reclamation districts.

The speed-up order was received from Floyd E. Dominy, reclamation commissioner. It is believed the order ultimately will affect employees of the regional reclamation offices of the 17 Western states.

Officials have not said what projects will be started ahead of the former schedule. It is assumed that major units of the billion-dollar Colorado River project will be among them.

Bloodgood's office said it was too early to determine the number of specialists — engineers, geophysicists and geologists—who will be required by private contracting firms to carry out the program.

The Dalles Dam TV

Dage Television Division, Thompson Ramo Wooldridge Inc., has been awarded a $70,069 contract by the Portland District Corps of Engineers for installation of a four-camera closed television circuit at The Dalles Dam on the Columbia River. Two of the four cameras will be used for security while the third and fourth will observe the pool behind the dam and the downstream face of the spillway.

► The Salt Lake City firm of **Gibbons & Read** won the contract for construction of Lewiston Dam on the Trinity River in California. It submitted the low bid of $2,410,542 for construction of the earth-filled dam. It will be 740 ft long and 80 ft high. Completion in 700 days is required by the USBR.

Construction is under way on a building designed with growth in mind, the Cyril S. Wenger Building for the Southern Nevada Power Co. in Las Vegas, according to President Reid Gardner. An eventual six-story building, the structure will grow two stories at a time and will contain every provision to allow for an orderly upward expansion. The initial two-story increment, scheduled for completion in March 1961, will contain 16,890 sq ft including the partial basement and will cost $440,900

WASHINGTON REPORT

Looking Toward 2000

A massive water and power development program for the next 40 years has been called for by the Senate select water resources committee, headed by Sen. Robert S. Kerr (D-Okla.). About $200 billion in water project construction is anticipated by the committee by the year 2000.

Hydroelectric generation and steam plant cooling will be the largest and third largest water users by the year 2000, respectively, said the Senate group. Hydrogeneration won't actually consume water, so the committee expressed no concern over this, but it did urge research to substitute air cooling for water cooling, where practical, in order to prevent "thermal pollution" of streams—that is, heating of water beyond the point where streams will support fish life, be able to oxygenate other pollutants.

An uncontroversial document, it will be used as an opening wedge to get specific legislation passed to implement its recommendations. Its five recommendations are:

- The federal government, in cooperation with the states, should set up and maintain comprehensive development and management plans for all major river basins. The President should submit to Congress, by January 1962, his program for completing such studies by 1970.
- The federal government, cooperating with the states, should encourage efficient water use and development through flood plain regulation, immediate review of areas where water shortages will be most acute by 1980, and study the needs for major reservoirs.
- The federal government should set up a 10-year program of financial aid to the states ($5 million yearly) for state planning of development needs.
- The federal government should set up a coordinated scientific water research program, and the President should submit such plans to the Congress by January 1962, so that federal funds to maintain such a program can be provided in the budget for fiscal year 1962-63.
- The federal government should prepare a biennial water supply and demand outlook for each of the 22 water resource regions. And the President should submit the first of these to Congress in January 1963.

The committee did not touch on hydroelectric development, other than to comment that "with the degree of river regulation that will be needed to provide for the nation's water needs in 1980 and 2000, there will be many opportunities for development of hydroelectric power . . . as there are alternate sources of producing electric power, however, the quantity of water needed for pollution abatement is assumed to be controlling" over power needs.

There will be adequate water for all uses through the year 2000, the committee concludes, but this will be on a national basis—some areas will suffer shortages, but these can be overcome by diversion of water between basins, research into weather control, desalting sea water, etc.

Regional water shortages will crop up first in the South Pacific region—where maximum use already has been reached; by 1980, it will be critical in the Great Basin, the Upper Rio Grande-Pecos River Basin, Upper Missouri Basin, Colorado River Basin; and by 2000, water shortages will be critical in the Western Gulf, Western Great Lakes and Upper Arkansas-Red River Basins.

Turned Down

The Interior Department turned down the application of five southwestern utilities to build their own transmission lines for wheeling power generated at three major federal dams in the upper Colorado River storage project.

The five companies have announced plans to fight the recommendation when funds to build the alternate federal grid are sought this year in the appropriations committees of the Senate and House of Representatives.

Interior Secretary Stewart Udall has indicated his agreement with the "11th hour" recommendation for an all-federal grid, made by Seaton in the last week of the Eisenhower administration. Seaton's decision was based on a recommendation by Reclamation Commissioner Floyd E. Dominy.

Basis for the recommendation in favor of federal lines was that the private system would fail to provide any financial advantage to the federal government or to preference customers: (1) the cost of wheeling power over the private lines would more than offset any savings in federal construction costs and this would affect adversely the whole Colorado River project's payout deadline; (2) higher power rates, needed to make up this deficit, would hurt seriously preference customers.

Interior's plan for federal lines calls for a 6-mill charge per kwh for firm power to preference customers, 2.5 mills for nonfirm power, $15 for peaking capacity. The project's amortization period ends in year 2049, including irrigation assistance to participating projects in Colorado, Utah, New Mexico, Arizona and Wyoming. Dams are Glen Canyon, Ariz., 900,000 kw (first power on line in 1964); Flaming Gorge, Utah, 108,000 kw (1963); Curecanti, Colo., 160,000 kw (awaiting final approval by Congress).

Dominy, in his recommendation for federal lines, said the private plan had met all criteria established by his office except one: that the proposed power rates would not affect adversely the economic feasibility and payout periods of the project, and would not reduce federal assistance for irrigation.

Utilities that proposed the private lines are Arizona Public Service, Public Service of Colorado, Public Service of New Mexico, Pacific Power & Light, Utah Power & Light.

Hearing in Portland

Fish conservation testimony on the rival Nez Perce-High Mountain Sheep projects is being presented to the Federal Power Commission examiner, William Levy, in a special hearing in Portland, Ore., which started March 13. A group of 24 fish intervenors won approval from Levy to transfer their portion of the proceedings to the West Coast to save them time and money.

Pacific Northwest Power (High Mountain Sheep) and the FPC staff had favored the transfer, but Washington Public Power Supply System (Nez Perce) objected originally on the grounds that it would afford a "hearing of headlines" in the area where the dams would have the most impact.

Levy also set an April 10 date for presentation of rebuttal arguments in the case, back in Washington, D. C.

Meanwhile, a battle between FPC Chairman Jerome Kuykendall, new Interior Secretary Stewart Udall and former Secretary Fred Seaton continued. Kuykendall refused to return to Udall the load-growth estimates of the Bonneville area for the next decade, submitted to the FPC in January by Seaton.

Udall wanted the estimates—prepared by Bonneville's commercial operations officer, Bernard Goldhammer—returned so his new administration could review them, change them if needed. Kuykendall refused, pointing out that Udall could send a second set of power estimates to the FPC, if he wanted.

Actually, Seaton's recommendations and estimates are dead. They would not be placed on the record until a Bonneville witness appeared to justify them at the Nez Perce-High Mountain Sheep hearings. (At such time, he would automatically move to have his estimates made part of the record.) Since nobody has appeared, the old estimates are in limbo.

But Kuykendall pointed to the physical impossibility of returning the estimates by 35 interested parties, and FPC officials, in the case.

Seaton's old estimates had indicated neither of the rival projects was needed because of the impact of added prime power (1.7 million kw) from the proposed U. S.-Canadian treaty development of the upper Columbia River (Arrow Lakes, Duncan Lake, Mica Creek, Libby Dams).

Udall, if anything, is inclined to disagree with the old estimates; probably would call for construction of one of the projects, regardless of possible fish passage problems.

Up to the Military

The military joint chiefs of staff hold the key to whether Southern California Edison will build a 360,000-kw nuclear reactor at Camp Pendleton, Calif. They must review a recommendation by Marine Corps Commandant David M. Shoup against construction of the proposed reactor on a 90-acre tract in the center of the camp.

Shoup says the reactor could be placed in the northwest corner of Pendleton, but that the company's proposed location would interfere with amphibious training operations. Edison claims Shoup's proposed location would not be suitable topographically, and would be too close to population centers.

The Atomic Energy Commission is anxious to keep the project alive and the new AEC chairman, Dr. Glenn Seaborg, is expected to fight for the project after he is confirmed to office by the Senate. Edison plans four reactors on the site eventually.

The final decision, of course, is reviewable by higher sources, even, than the joint chiefs—clear up to President Kennedy, if necessary.

NUCLEAR NEWS

Nuclear Plant Started

Major construction work started Jan. 23 on the nuclear power unit of Pacific Gas and Electric Co.'s Humboldt Bay power plant with the pouring of the first yard of concrete to form the underground caisson that will contain the reactor.

When this 60,000-kw boiling water reactor plant was first announced in February 1958, PG and E said it was being designed to produce electricity with nuclear fuel at costs that would eventually be competitive with oil fuel at that location. This nuclear unit is now expected to achieve this goal during its third year of operation.

Humboldt Bay will have a new system of reactor containment called pressure suppression, developed by PG and E. Pressure suppression substitutes a condensation tank, partially filled with water, for the dome or capsule that has been used to contain earlier power reactors. The underground pressure suppression system would catch and suppress by condensation the steam carrying any escaping radioactivity that might be freed from the reactor system in the unlikely event of an accident. This system was approved by the AEC last November, after more than a year of tests and studies.

Bechtel Corp. of San Francisco is general contractor for the project. The reactor and related facilities are being designed and built by General Electric Co. G-E also is fabricating the 17 tons of uranium fuel that will comprise the first reactor loading.

The entire $20,600,000 cost of the plant is being provided by PG and E. Completion of this project is expected by the summer of 1962.

First concrete flows into forms for PG and E's Humboldt Bay nuclear power unit at Eureka. Dumping the bucket is Edward M. Pettersen, chairman of the County Board of Supervisors. Looking on are President Norman R. Sutherland of PG and E and A. D. Bragg, General Electric's Pacific Region manager

Thermonuclear Reaction

The University of California has announced a significant advance in the technology of a controlled thermonuclear reaction with the confinement of deuterium plasma at a temperature of 60,000,000 F for one millisecond. The favorable confinement time and the high ion temperature not previously achieved taken together are considered to be the important features of the experiments. In a recently constructed "magnetic mirror machine" the plasma is heated by compressing it magnetically in successive stages as it travels the 10-ft length of the machine. Successful achievement of practical controlled thermonuclear reactions and their economical development would provide the world with a virtually unlimited source of power, since one out of every 4,000 hydrogen atoms in the water of the oceans is a deuterium atom.

Big Rock Point Plant

The AEC has signed contracts with Consumers Power Co., Jackson, Mich., and the General Electric Co., San Jose, Calif., for a prototype nuclear power plant project under the commission's power demonstration reactor program.

The plant will be built at Big Rock Point, Mich., and will be powered by a reactor of the high power density boiling water type. The initial fuel loading will permit operation of the plant at a power level of 50,000 ekw, but it is expected that during the research and development program, the electrical generating capacity will be increased to 75,000 kw.

Under the contract between the commission and Consumers Power, the company at its own expense will design, construct and operate the nuclear power plant. The commission will reimburse the company for costs up to $500,000 in connection with the research and development program and will waive fuel use charges valued at about $1,650,000.

Under the contract between the commission and G-E, the commis-

sion will support the research and development program up to a maximum cost of about $3,700,000.

Under separate contracts with Consumers Power, the Bechtel Corp. of San Francisco will be responsible for the design and construction of the plant and G-E will supply the nuclear fuel. General Electric, as subcontractor to Bechtel, will also furnish the nuclear steam supply system and certain conventional power plant equipment for the project. Consumers Power estimates the capital costs for the plant, including site and site preparation, to be $27,762,000.

A construction permit for the plant was issued to Consumers Power Co. on May 31, 1960. Initial criticality of the reactor is scheduled for September 1962.

Reactor Vessel Shipped

The first reactor vessel for a nuclear power facility to be operated by a municipality was shipped Jan. 9 from the yards of Pacific Coast Engineering Co., Alameda, Calif., to its destination, Piqua, Ohio.

This vessel, 28 ft, 7 in. high with inside diameter of 7 ft, 8 in., is built entirely from carbon steel with the exception of a stainless steel overlay on the top cover. This equipment is a major part of the 11,400-kw organic moderated reactor plant being built by Atomics International, a division of North American Aviation Inc., under contract to the AEC. The city of Piqua, Ohio, is providing the nuclear plant site and conventional turbine-generator and will operate the entire plant when it is completed in mid-1961.

Greatest Probability

Discussing the civilian power reactor program before the Atomic Industrial Forum in San Francisco recently, Dr. Frank Pittman, director of AEC's Division of Reactor Development, stated that pressurized and boiling water saturated steam systems and the organic cooled and moderated system still offer the greatest probability of meeting the initial objective of competitive nuclear power in high cost areas by 1968. He went on to say that he didn't mean to imply that the superheat reactors or the liquid metal or gas cooled reactor systems cannot meet this objective but merely that when all factors are considered they appear less likely candidates to reach this goal.

COMMUNICATIONS

Spectrum Space

Hard on the heels of wide-area telephone service (WATS) mentioned last month, and similar to the "bulk" telephone channel tariff that was apparently filed only in New York State last year to entangle the New York Power Authority (successfully), we now have **Telpak** by AT&T. This tariff is being filed both intra- and interstate and is unique to say the least.

Briefly, spectrum space can be purchased in different bandwidths starting at $15 per airline mile per month for 45 kc and progressing up to 1,000 kc at $45. Customer can then select a variety of multiplex such as voice, teletype, data transmission, etc., at a price per terminal of course, up to the full capacity of the channel.

Terminal charges are made only for equipment actually used; however, the full charge is made for the wide-band channel regardless of whether it is fully loaded or not. Offerings are of course subject to approval of the various state and federal regulatory bodies.

Is there a gladiator among us who will order a one-mile 1,000-kc channel with one-voice circuit?

Tone Signaling

Well, what do you know, the **Tone Signaling Docket,** which has been in the mill so long that the author has forgotten the number, has been acted on by the FCC. It permits operations essentially as requested by NCUR with some very minor changes.

In addition to the alarm functions from unattended stations now in effect, the rules provide for "manually supervised transmissions as may be necessary to restore lost service, place stand-by equipment in operation, or to correct any abnormal condition, which otherwise would result in an immediate failure in the production, transmission or distribution facilities of the licensee."

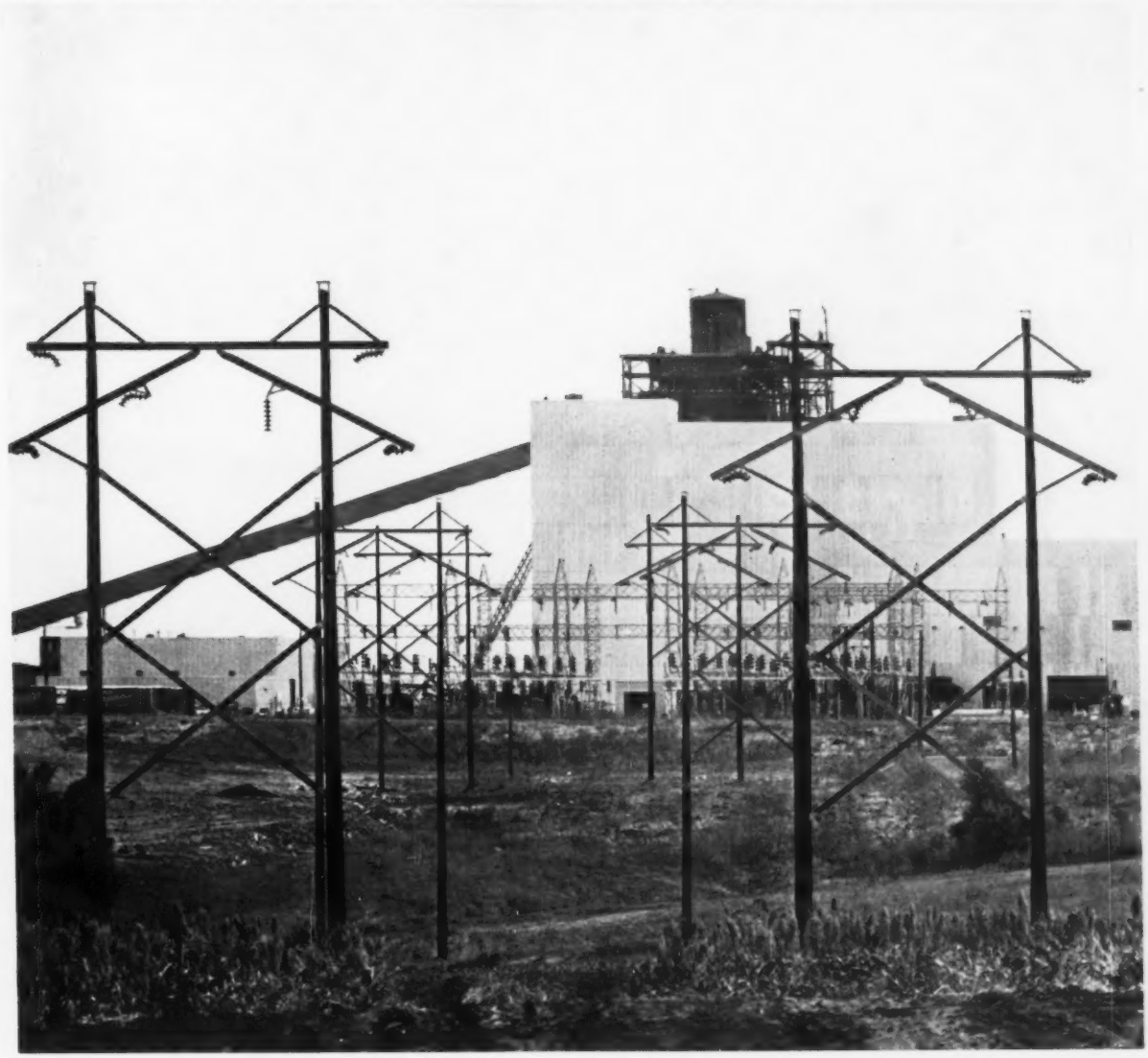
However, the licensee must use only frequencies permanently assigned to him for voice communications and cannot obtain a frequency assignment for control and alarm purposes only in the mobile bands. Length of transmissions, etc., are also specified by the commission, and while it represents no change in regulations, a format has been adopted for frequency tabulation which is certainly welcome—they're all in one place now instead of being spread over several pages. The complete order is published in the Federal Register of Jan. 12, 1961, and the regulations themselves will become a portion of Part 11.

► **West Coast AIEE members take heed!** The Pacific General Meeting in Salt Lake City next August needs good papers to make it a success. It would be particularly fine if there were enough on communications to justify a meeting of that committee and a paper is virtually your passport to the meeting with its opportunity to discuss engineering with the best. Bob Brinton of Pacific Gas and Electric, who is vice chairman of the communications committee for the West, has said that the development of equipment is in the east, but much of its application occurs in the West. Why not use this as a keynote? After all, the electric utility communications engineer is primarily interested in application.

► The possibility of using **industrial TV under water** for the observation of gates, screens and other structures associated with hydroelectric developments is still being actively investigated by several Northwest electric utilities. Both Puget Sound Power & Light Co. and Idaho Power Co. have conducted tests and come to about the same conclusion—suitable equipment is available, but even illumination is difficult to produce, and astonishingly high powered lights are required. Turbidity of the water, of course, is a major factor in determining the distance that can be worked to obtain a given degree of detail. Even slight murkiness reduced visibility to inches.

► **A simple elapsed time indicator** called a Chronistor is being produced by Bergen Laboratories, 60 Spruce St., Patterson, N. J. The device is the size of a 3AG fuse and depends on low d-c current and voltage to produce electroplating action within the transparent body as an indicator. Since the cost is under $2 and the power requirements negligible, it should prove to be a convenient means for obtaining information in large quantities. Only drawback might be d-c requirement; however, almost any rectifier could supply its small requirements.

75,000 KW Sodium Graphite Reactor station for Consumers Public Power District at Hallam, Nebraska



The Peaceful Atom

Helping the world double its power supply in the next ten years

The fuel of the future is in the atom. But even now, lights are burning, wheels are turning, thanks to atomic fuel. Atomics International, a world-wide leader in advanced, high-performance reactor systems, has over 15 years' experience in designing, constructing, and operating reactors. Two of the world's most advanced atomic power stations are now being built by AI under AEC programs. The wealth of experience and facilities at Atomics International will help the world's power-producing companies in their plans to double the supply of electricity in the next ten years.

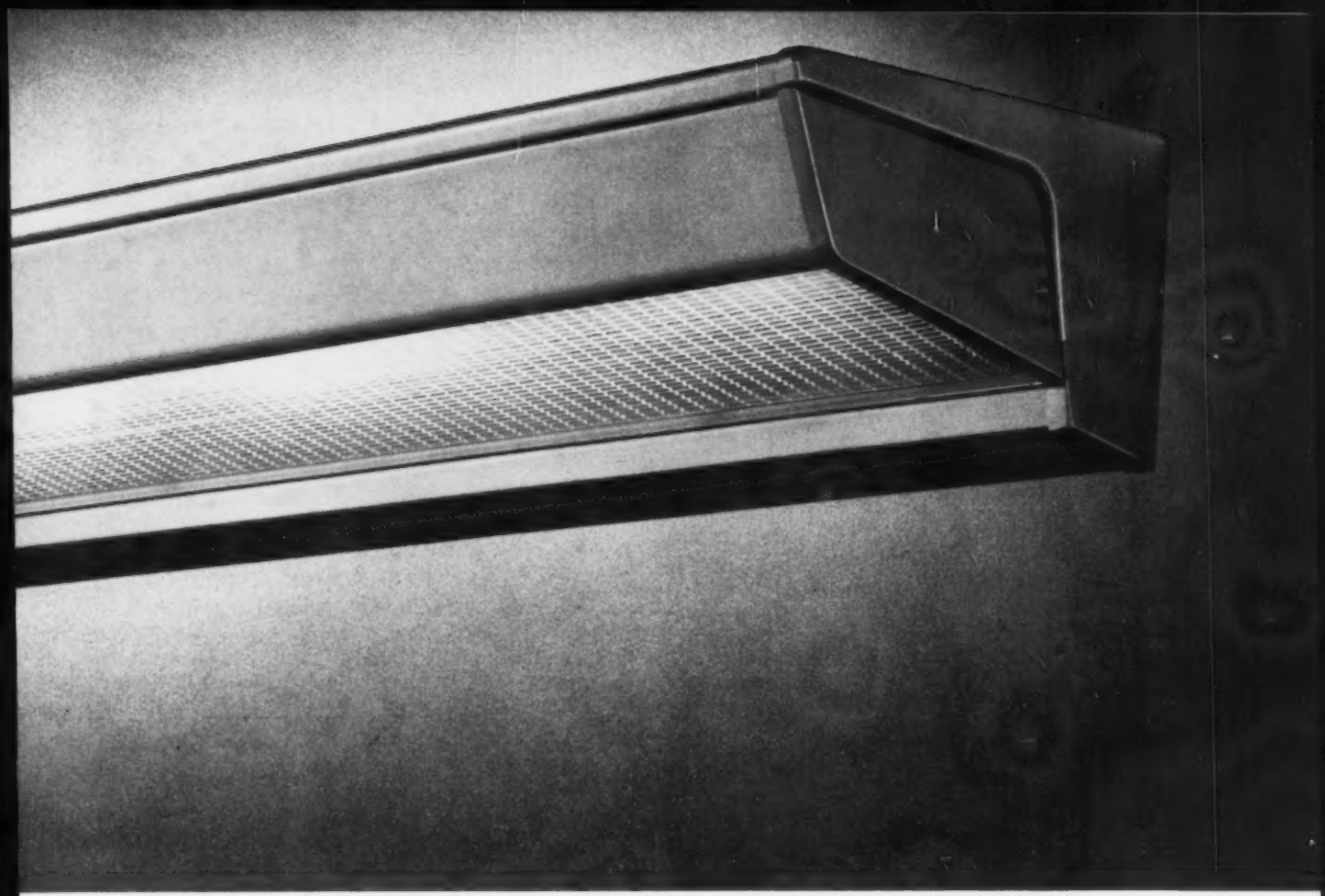
ATOMICS INTERNATIONAL

Division of North American Aviation

Pioneers in the creative use of the atom

World Headquarters: Canoga Park, California, U.S.A. Cable Address: ATOMICS. *Other offices:* Washington, D.C., U.S.A.; Geneva, Switzerland. *Affiliated with:* INTERATOM, Bensberg/Cologne, Federal Republic of Germany and DYNATOM, Paris, France

See the difference TRANQUILITE makes in transforming a cold, harshly-lighted hospital room into an attractive, modern setting. Patients look better, see better . . . even feel better!



TRANQUILITE ...a "Decidedly Better" Hospital Bed Light by DAY-BRITE

- Switching provides reading light, night light and general illumination
- Convenient electric outlet for examining light, electric razor or radio
- No annoying glare . . . ideal for multiple-patient rooms and wards
- Available in 2 or 4-foot lengths, stainless steel or baked white enamel finish

First time you see it you'll know that here's a behind-the-bed fluorescent hospital fixture worthy of the Day-Brite name—with the clean lines and quality look you expect from America's first name in lighting equipment.

But only when you have seen it **in action** can you fully appreciate what an amazing difference TRANQUILITE makes. Cold, clinical-looking hospital rooms take on new warmth . . . become more inviting. In older rooms, TRANQUILITE's soft illumination hides defects . . . adds a modern touch.

TRANQUILITE is just one of a complete line of "Decidedly Better" Day-Brite fixtures for every hospital need. All are **/easy to install/ easy to clean/easy to maintain.** Get the full story from your Day-Brite representative, or write: **Day-Brite Lighting, Inc., 6260 N. Broadway, St. Louis 15, Mo., and Santa Clara, Calif. In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ont.**

DAY-BRITE®

NATION'S LARGEST MANUFACTURER OF COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

PEOPLE

Man of the Year

James Donald "Don" Gawne of Seattle City Light was selected "Electrical Man of the Year" for 1960 by the Puget Sound Electric League for "his unselfish service" to the electric industry in the Puget Sound area. In making the award League President James Hartwig commended Gawne for his 41 years of electrical service to Seattle.

Gawne has been with Seattle City Light during that entire period, first as a clerk and since 1936 as sales supervisor in charge of promotion and utilization. But serving Seattle electrically did not end with introducing new uses to customers. Since 1953 he has been a member of the Seattle Electric Code Review Board where he has constantly worked at improving the code. He has also furthered practical code inspection through the Northwest Section of the IAEI, of which he is a board member.

"He is probably more responsible than any other individual person for the reputation that Seattle has obtained as the 'most electrified city,'" said Maynard Sundt, manager of the Puget Sound Chapter, NECA, who made the introductory talk.

► **E. O. Thoman** is now Yakima district manager for Pacific Power & Light Co., succeeding **L. W. Dick.** Dick retired after 47 years service, including 16 years as Yakima manager, **Allan C. Bartholomew** succeeds Thoman at Springfield, Ore.

► **Otto E. Zwanzig** has given up his post as general sales manager for B. C. Electric Co. at Vancouver and has gone to Washington, D. C., as a partner in Foster Associates, business and economic consultant.

► **Roger Ernst,** former Assistant Secretary of the Interior, has been named to a new position as planning consultant for Arizona Public Service Co. Ernst was appointed assistant secretary for Public Land Management by President Eisenhower in 1957. Before that time he spent six months as executive secretary of the Central Arizona project and was state land commissioner from 1953 to 1957.

► **Samuel B. Morris,** retired chief engineer and general manager for the Los Angeles Department of Water & Power, has been appointed to a four-year term on the California Water Commission by Governor Brown.

Don Gawne of Seattle City Light (far right) was named Electrical Man of the Year by the Puget Sound Electric League. Pictured with him at the industry luncheon honoring him for 41 years of unselfish service are, from left: Jim Hartwig, president of the league; Dr. Paul Raver of Seattle City Light; Paul J. Alexander, city council member

Luce

Charles F. Luce, Bonneville Administrator

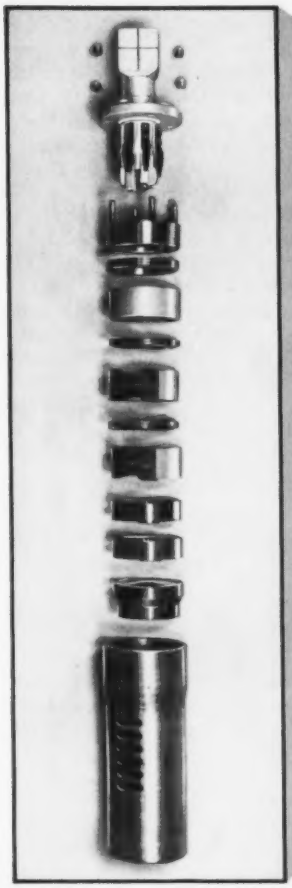
Charles F. Luce of Walla Walla, Wash., took over the post of Bonneville administrator on Feb. 15. He succeeds William A. Pearl.

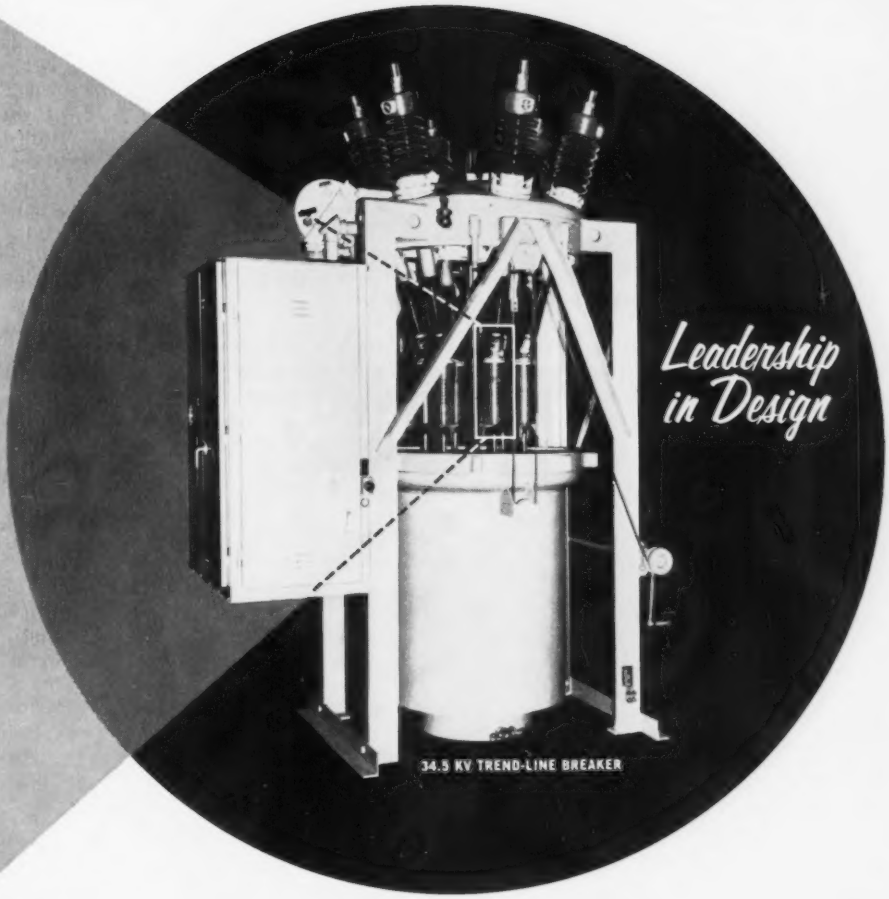
Luce has practiced general law in Walla Walla for 15 years. Born in Platteville, Wis., on Aug. 29, 1917, he was graduated from the University of Wisconsin in 1941 with honors and held a Sterling fellowship at the Yale University law school. At one time he served as clerk to Justice Hugo L. Black of the U. S. Supreme Court.

His initial experience in natural resources was gained as a member of the legal staff of the Bonneville Power Administration, where he served in the summers of 1944 and 1946. He also served a short period as legal consultant to the Secretary of the Interior in 1949. His other federal employment included service as an attorney for the Board of Economic Warfare. He is a member of the Washington, Oregon and Wisconsin state bar associations and of Phi Beta Kappa.

► **C. E. Cannon,** chief engineer for Washington Water Power Co., has been elected a vice president. He started with the company in 1929 as an assistant engineer and later became an engineer. He was named an electrical engineer in 1943, chief electrical engineer in 1953 and chief engineer in 1958.

► Commissioner **Arthur Kline,** a native of Cheyenne, Wyo., has been re-elected to serve as vice chairman of the Federal Power Commission for another year. Kline is a Republican and took office as a member of the FPC in June 1956, for his first five-year term. He has served as vice chairman since Jan. 1, 1960.





I-T-E FIRSTS...
IN POWER CIRCUIT BREAKER DESIGN

Fiberglas tubes...advanced KOOL-ARC interrupters...TREND-LINE breakers... are proven contributions to a better product for the industry

Although the economy of the industry may fluctuate greatly, I-T-E holds the line on product quality . . . works hard to maintain leadership in power circuit breaker design.

First in this country to introduce the all-fiberglas tube, I-T-E reduced the size of its standard interrupter while increasing tube strength and providing better internal clearances in the breaker. From there, I-T-E engineers moved ahead to develop the new KOOL-ARC design. The KOOL-ARC interrupter then led to the development and introduction of the much heralded, single-tank TREND-LINE breakers, now field-proven and available in subtransmission ratings.

The KOOL-ARC interrupter incorporates simple design and offers easy maintenance. It can be removed from the breaker as a unit and be readily disassembled and assembled in the field by maintenance personnel. KOOL-ARC improvements include not only the keying of all internal parts for simple, rapid field assembly, but also the selection of better materials and processes throughout, such as the use of molded polyethylene rather than fiber for splitter plates. Through this kind of meticulous attention to product detail, I-T-E maintains its leadership in design . . . holds high industry's confidence in the I-T-E product.

For descriptive literature, write the Power Circuit Breaker Division, 1667 N. Main Street, Los Angeles, stating the ratings in which you are interested. Address Dept. EWE-1454-1.

I-T-E CIRCUIT BREAKER COMPANY

For phone number of closest representative see advertising index in back of book.

► **G. L. McDonald** has been appointed Central division sales manager for Puget Sound Power & Light Co., succeeding the late Harry B. Batchelder. Central is the third Puget Power division that McDonald has served as sales manager. His first such position was with the Western division at Bremerton, and the second with the Northern division at Bellingham. He joined the company in 1928 at Port Orchard.

McDonald

► Two British Columbia engineers have been elected to the grade of Fellow in the AIEE for their work on the world's longest extra-high-voltage submarine cable. They are **Henry Smith** and **Francis Wollaston.** Smith, formerly chief engineer with B. C. Electric and subsequently general manager of B. C. Engineering, had major responsibility for planning the submarine cable across the Strait of Georgia to Vancouver Island. He is now executive vice president and director, International Power and Engineering Consultants Ltd., at Vancouver. Wallaston, presently consultant to International Power and Engineering Consultants, was directly responsible for engineering design and development of BCE's extra-high-voltage lines. He was formerly the company's chief of electrical engineering department.

► **Francis E. Ash** has been made manager of the Administrative division, Department of Public Utilities at Tacoma. As part owner and vice president of the Tide and Bay companies, he has supervised the electrical and mechanical features of construction jobs from Alaska to Hawaii. He is currently chairman of the Tacoma Chamber of Commerce industrial bureau and chairman of the interindustry liaison committee of the National Association of Plumbing Contractors.

Ash

► **C. Frederick Schaus** is now manager of industrial appearance design for **General Electric's** electric utility engineering operation. . . . **Douglas K. Bogart** has been appointed sales promotion manager for **Preformed Line Products Co.** . . . **Fargo Mfg. Co.** has appointed **Scott R. Wheaton** as vice president of marketing. . . . **George M. Stapleton** has been made general manager of **Ward Leonard Electric Co.** . . . **William E. Wilton** has been elected executive vice president of **Jasper Blackburn Corp.** . . . **Donnell D. MacCarthy** succeeds **Dr. Pier A. Abetti** as manager of **G-E's** Project EHV.

► **W. R. Barker** was appointed Tacoma branch manager of Graybar Electric Co. to succeed **R. J. Franzen,** who has been given a special sales assignment in the Seattle district office. He joined Graybar at Butte, Mont., in 1949.

► **Frankland Smith** has been appointed project engineer for Tacoma City Light's Cowlitz project, replacing the late Carl Pflugmacher. He had been head civil engineer for the project and had been in charge of upstream and downstream fish migration facilities at Mayfield Dam. At one time he headed the Fisheries Technical Committee, composed of state, federal and local engineers, biologists, and specialists in the field.

Smith

► **Major General Alfred D. Starbird,** now director of military applications, U. S. Atomic Energy Commission at Germantown, Md., will become division engineer of the North Pacific division, U. S. Army engineers. He succeeds **Brigadier General Allen F. Clark Jr.,** whose tour of duty included direction of final preparation of the Columbia River 308 report. General Clark has indicated that he will retire from the Army.

► **Donald R. McClung,** president of Pacific Power & Light Co., has been re-elected an Oregon director of the NAM.

► **Bill Carkeek,** sales consultant in Renton for Puget Sound Power & Light Co., has been awarded a bronze plaque and a cash prize in the national "Power-Up" program sponsored by Westinghouse. He was one of seven winners in the United States, and submitted an article on total electric service for schools.

Deaths

►**W. H. "Hank" Fisher,** chief electrical engineer for California Oregon Power Co., died unexpectedly at his home in Medford. Born in Oregon in July 1911, he was graduated from Oregon State College and joined Copco as a chainman and draftsman. His duties were interrupted by military service from 1942 to 1945, when he returned to the company as an electrical engineer. He served a four-year term on the Medford City Planning Commission and in 1954 he was appointed chief electrical engineer for Copco. At the time of his death he was serving as chairman of the Medford Subsection of AIEE.

► **Dean Barline,** 51, director of the Tacoma Department of Public Utilities, died Feb. 12 in a Tacoma hospital after suffering a heart attack at his home. An attorney, he was appointed utilities director in 1954 after previously representing Tacoma City Light in legal matters. He had become known throughout the Pacific Northwest as a leader in the public power movement and currently was serving as president of the Northwest Public Power Assn. and as a director of the American Public Power Assn. He was also a member of Gov. Albert Rossellini of Washington's policy advisory committee.

► **C. R. "Hap" Hazard,** 60, district manager for Line Material Industries at Portland, died on Dec. 20 following a heart attack. A graduate of Iowa State College at Ames, Mr. Hazard had been with Line Material at Portland since 1935. Before going with L-M, he was with Public Service Co. of Northern Illinois.

► **Joseph Stallings,** 64, North Pacific district credit manager for Westinghouse Electrical Supply in Seattle, died Dec. 6 after a heart attack. He joined Westinghouse 25 years ago in Seattle as an accountant and had served as credit manager for 20 years.

► **Ernest Hoffman,** aged 59, for the past 13 years salesman for the Square D Co. in the Oakland and North Valley area, died of lung cancer Jan. 13, in Oakland.

► **John H. Tacke,** 61, associated with Kaiser Engineers since 1931, died Dec. 19 at Richland, Wash. He had been serving as resident manager for Kaiser on construction of the new production reactor at Hanford Works.

ALCOA ALUMINUM
ACCESSORIES ROUNDUP

Wider-range bolted full-tension dead end clamp

This is the new Cat. 302 dead end clamp. It's a companion to the recently introduced 301, with which it shares many common features. A full-tension clamp, the new 302 holds a minimum of 95% of the rated strength of conductors for sizes 2-6/1 to 266.8 18/1 ACSR. When paired with the 301 (handling sizes No. 6 to 2/0 ACSR), the two take the place of *three* previously available clamps for the range of sizes covered. Thus, it is possible to simplify inventories by standardizing on these *two* clamps.

The Cat. 302 clamp is cast in one piece of a high-quality, corrosion-resistant aluminum alloy. The two ½-inch U-bolts are also of high-strength aluminum alloy, which means that all parts surrounding the conductors have equalized coefficients of thermal expansion. The bolts are supplied with an Alumilite 205 finish and grease film. They withstand corrosion and are easy to tighten, since the threads are accurate and smooth. And because the bolts are long, to give plenty of clearance, installation is convenient.

For ease of aligning the cotter pin hole, the galvanized steel clevis pin has a clipped edge. The pulling eye, an integral part of the clamp structure, is large, so it's easy to use the hoist hook.

Off-the-shelf delivery of the new Cat. 302 dead end clamp is available. Your nearby Alcoa-Rome representative can supply information on delivery, price, or the clamp itself.

"Extra-large" accessories

The small compression joint—barely visible here—is a service entrance connector used on No. 2 conductor. The other one is designed for a full-tension splice of 2.32-inch diameter expanded ACSR. Many of today's installations—particularly EHV—require "extra-large" dead-ends, joints, armor rods and other accessory parts. Alcoa meets the need for small, medium, large or even "extra-large" accessories.

→

Stockbridge dampers–Aeolian vibration control

by C. B. Rawlins, Research Engineer, Alcoa Research Laboratories, Massena, N.Y.

The Stockbridge damper is an energy dissipation device removing the energy of vibration imparted to a conductor by wind. It consists of a clamp attached to the conductor and a stranded steel cable connecting a pair of bell-shaped inertia weights to the clamp. Conductor vibration induces a relative motion between the clamp and the inertia weights. This in turn causes flexure of the steel cable, resulting in dissipation of mechanical energy by friction between the strands of the damper cable.

The effectiveness of the damper depends strongly upon how efficiently the vibration motion of the conductor can be translated into the flexure of the damper cable. The damper will dissipate energy for any wind velocity at which vibration of the conductor is translated into sufficient flexure of the damper cable to produce interstrand slipping.

In contrast to most tuned damping devices, which operate best only near their natural frequencies, the Stockbridge damper is designed for efficient transfer and dissipation of energy at frequencies far from its two natural frequencies. In fact, the most efficient performance generally takes place at frequencies which are above the natural frequencies.

Under most field conditions, properly selected dampers, properly spaced, are effective in eliminating damaging vibration. Damper sizes for various conductors are listed in Alcoa catalog DC2A. Spacing rules are specified in the publication "Notes on the Application of Stockbridge Dampers."

For unusual vibration conditions or line construction, special engineering consultation is available through Alcoa-Rome sales offices.

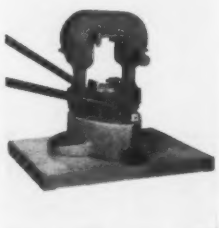
Hydraulic compressor versatility

What types of compressors (and how many of each) are enough? Your answer to both questions depends on the nature and scope of your operations. This is why we offer such a wide choice in compressors. Check the latest published data from Alcoa on this subject; there are five hydraulic compressors alone listed as current. Herewith is a brief run-down.

MODEL 12A • Small and light weight (a mere 11 pounds), it's suitable for ground or aerial operation. Hand operated, it provides a thrust of 12 tons. It features conveniently located controls, adjustable die gap, rapid piston advance and a C-head that's rotatable through 180 degrees.

Model 12HA • This one is also lightweight and has a full 12-ton thrust. Designed primarily for swift installation of ALCOA Tubular Compression Accessories. Its small size and the fact that it can be operated in any position by a remote pump make it well suited for use in close or cramped quarters or with Alcoa's new hydraulic hot stick.

Model 60A • A proven rugged, fast, convenient portable tool for ground or aerial use, it delivers 60 tons of thrust for maintenance or construction with any commercial conductor sizes and tubular accessories. A remote pump can be hand operated or driven by either electric or gasoline power.



Model H2 • With a thrust of 100 tons, this heavy-duty tool is capable of handling a full range of conductors. The compressor can be operated by integral hand pump or with a powered hydraulic pump. The two hand pumps provide a high speed for raising the piston until it contacts the accessory to be installed, and a low speed for closing the dies.

Model H2H • A simplified and lighter-weight version of the H2, this tool can be operated in any position. It is designed specifically for use with a remote pump for extra speed and versatility. Pumps for hand, electric motor, or gasoline engine operation are available.

Summing up: Alcoa's new Cat. 302 dead end clamp becomes a companion to the Cat. 301—together taking the place of *three* previously available clamps.

Extra-large accessories put a wide range of sizes at your disposal.

Stockbridge dampers are designed for efficient energy dissipation over a wide range of frequencies.

Alcoa's broad line of compressors provide the answers to the questions of what type? how many?

Your nearby Alcoa-Rome salesman is eager to supply additional information on any or all of these items. Why not call him today? For the name and address of our nearest representative, write to Rome Cable Division of Alcoa, Dept. ACR-4, Rome, N. Y.

ALCOA
ROME CABLE
DIVISION

ASSOCIATION AFFAIRS

IES regional activities meeting at Monterey was led by Roy Kreyser, center. On each side of him were "Chic" Macy, regional program schedule chairman; Roy Dahlin, membership chairman; and Mel Fenton, 1961 regional conference chairman

IES Strategy Meeting

"General staff" of the South Pacific Coast Region, Illuminating Engineering Society, met to discuss the year's strategy at Monterey Jan. 27, presided over by Roy H. Kreyser, Los Angeles Department of Water & Power, regional vice president. Representing the region's five sections and three chapters there were 28 in attendance from all parts of California. IES Director Sam Hamel, absent on a business trip, sent in a report of the last national directors' meeting. Reports were heard, likewise, from Roy E. Dahlin, regional membership chairman; Carlton Thompson, sustaining membership chairman, through Al McCutcheon; Joe Wood, regional applied lighting competition chairman; C. W. "Chic" Macy, regional program chairman; and William Cyr, regional public relations and information chairman. Mel Fenton, conference chairman for the 1961 regional conference at Sacramento, outlined in detail both the type of program being planned by Program Chairman Charles Gibson and the arrangements being made to handle the entire conference.

Praise was accorded Chic Macy for the success of the programming of national speakers of importance to cover the various sections and chapters in a circuit. Except for some minor difficulties, the plan has worked well and provided the chapters and sections with a speaker of national prominence and that speaker with a guaranteed series of scheduled meetings and good attendance. As Macy retired from PG and E, assignment of continuation of this program was given to Walter Howard of General Electric Lamp Division, Oakland.

Scheduling of the 1962 annual regional conference in San Diego in charge of Robert Gray of California Electric Works was discussed. However, the chief concern was for the 1963 regional conference location. Diablo Section in Oakland did not feel that it had even a promise of adequate hotel facilities and asked deferment to 1965. However, that year was assigned to San Jose. The possibility for Arrowhead Chapter or the Yosemite Chapter to take the 1963 date is to be investigated.

► Lester B. Johnson received an honorary life membership certificate from the **International Association of Electrical Inspectors** at a special meeting Dec. 13 in his honor at General Electric Supply Co. building, Salt Lake City. Johnson has been in the electrical industry 40 years, in the mountain states chiefly for General Electric Co. In his school days in Durango he sold and installed farm lighting plants and worked vacations as station operator for Western Colorado Power Co. After graduation from University of Colorado in 1919, he went with General Electric and has been with the Construction Materials Department, where he did an outstanding job in the Salt Lake City, Denver and, for a short time, Toledo, Columbus, Cincinnati, Louisville, Dayton and Indianapolis territories. He was one of the founders of the Utah Chapter, IAEI, as well as of the Utah Section, IES, from which he also received an honorary life membership upon his retirement.

► **Nevada Chapter, IAEI,** has plans for its annual meeting to be held at Ely, Nev., on the third Saturday in April. At its last meeting in connection with the IAEI Southwestern Section's convention, Andrew Ulrick, chief engineer for the city of Ely Utility Department, was named chairman, John C. Orrock, electrical inspector, Las Vegas, was named vice chairman and Jack Smales of Elko re-elected secretary-treasurer. Other executive committee members are Lynn Stiner of Ely, E. C. Braswell, Winnemucca; Al Gibson, Las Vegas; John Kitchen, Reno; Ralph Bisset, Reno; Harold Portner, Clark County; I. J. Sandorf, University of Nevada, and Mel Lundberg, Elko-Lamoille Power Co.

Les Johnson tacks up an IAEI honorary membership beneath his IES one at home

PCEA Committee Notes

Evidence that committees are hitting the mark in their goal of defining the problems ahead and establishing a long-range program to overcome them can be seen in the reports arriving at the PCEA headquarters.

Of course, the aim is not only to define the long-range problems but to make year-to-year progress as well, and an outstanding example of this was demonstrated in January with the mailing of an attractive brochure prepared under the stewardship of the Agricultural Electrification Committee.

Sixty thousand of these brochures, titled "Full Power on the Farm," have been distributed to member utilities in the quantities they requested.

The colorful, fold-out mailing piece was laid out by Frank A. Miramontes of Pacific Gas and Electric, chairman of the committee last year. A humorous, four-color cartoon scene of life on the farm serves as the background for the title and the subhead: "Three wire — single phase safety—wiring motor protection." Inside are carefully explained steps under the general heading of "Planned Farm Electrification—Pays Off."

The text of the brochure was prepared by the agricultural electrification committee and the layout was done by the staff at PG and E.

Frank E. Lucking of California Electric Power Co., chairman of the Appliance Committee, reports that his group is studying various successful courses from throughout the country on appliance dealer management.

He said the committee is selecting the highlights that will apply in the PCEA territory and will make a composite of those that will be distributed to interested groups. Briefly, this will tell the best source of materials and instructors for courses on how to run an appliance business.

It was further suggested that instructors for these courses be requested to write one-page summaries of their portion and distribute copies to their students. At the end of the course, the students will have a reasonably complete reference manual. These, in turn, can be digested by the committee in the future and made into a comprehensive and effective training manual, Lucking's group pointed out.

The Home Economics Committee is continuing its workshop program, which has been very successful for many years. Mrs. Helen R. Taaffe of Westinghouse, northern chairman, and Mrs. Mary K. Means of San Diego Gas & Electric, southern chairman, have both scheduled workshops for 1961.

One was held in San Luis Obispo on Feb. 11 under the auspices of the northern section, which is also scheduling another for April 7-8 in Eureka, and a third is tentatively scheduled in San Jose. The southern section is planning a workshop in March in Fontana.

Members of the Heating and Air Conditioning Committee reopened the study of the practicability of producing a Homeowner's Guide to electric heating and air conditioning.

The thought is to prepare a brief, profusely illustrated booklet that will help the homeowner select the heating or cooling system or both, best suited to his home, its locale and best suited to his family's particular needs.

The proposed pamphlet would list the advantages of each system or process and their most efficient use. It would also describe the conditions under which they would operate least efficiently. It would also stress proper engineering and installation procedures and tell of their value to the homeowner.

A subcommittee of the Heating and Air Conditioning Committee has been formed to study the possibility of setting up a course for training installation and maintenance men and also to investigate the means and methods for attracting more workmen into this field.

Several suggestions have been offered by the Lighting Committee for a long-range pull on its relighting program.

One is to explore means of getting good lighting in homes of utility personnel. The committee suggested several means for making this attractive to employees of the various utilities.

The members also said the utilities would be asked to consider a cooperative program with manufacturers in which they would use a portion of their advertising budget to promote specially priced fixtures, where they might offer to furnish on request the names of local installers and where they could have their home service center program leaders devote a short period of the time to lighting and also display new light fixtures in the center.

They suggested that utilities and manufacturers could pool their photographs and movies of outstanding lighting installations in a central location from which all could bor-

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However, when you make Graybar your auxiliary warehouse for electrical equipment and supplies, you open possibilities for savings. An increase in the number of items on the Graybar order, can save you time in writing orders and in processing them. So can the blanket order for a specified period. Other measures save at inventory and auditing time.

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row for various promotional uses.

A final suggestion was that good lighting be emphasized wherever possible in model homes.

Members of the Commercial and Industrial Lighting Committee, under the direction of Chairman Fred Bertolone of Lighting Dynamics and Vice Chairman Roy Dahlin, Southern California Edison Co., are readying a lighting sales kit for distribution.

Purpose of this kit will be to stimulate relighting sales in the commercial field. It will contain 35-mm color slides of store and shop "before and after" lighting installations, supplemented with a script describing the benefits to owners of relighting. A tape recording of this same information will be offered for an "automated" presentation to service clubs and like groups.

These kits are being designed expressly to appeal to electrical contractors, distributors' salesmen and electric utility sales personnel. They will be offered at cost in the near future through the PCEA office.

In general, all of these and other committees of Business Development Section are now directing their efforts toward constructive reports, which will be submitted to the section conference in the Sheraton-Palace Hotel in San Francisco on April 17 and 18.

The conference of the Engineering and Operating Section, to be held in the Ambassador Hotel, Los Angeles, on April 6 and 7, promises to be one of the outstanding events for this section. Details have been mailed to all members. They are urged to read them carefully and then, of course, attend.

► Speakers for the three-day conference of the **Electrical Maintenance Engineers Assn. of California,** at the University of Southern California at Los Angeles March 28-30, have been announced. The sessions will include electrical code, maintenance in small and large plants, human relations, electronics and management and maintenance. Tentative roster includes Donald K. Higgins, American Potash & Chemical Corp.; Regis Gubser, California Consumers Corp.; Frank S. Miller, Robertshaw-Fulton Controls, Grayson Division; Henry Lee, PhD, the Epoxylite Corp.; Frank Pierce, Union Oil Co. of California Refinery; Bernard A. Shrive and Richard Pehl, Kaiser Steel Corp.; Floyd O. Nelson, Rome Cable Corp.; Paul E. Murphy, Aerojet-General Corp.; Carl Geiges, Underwriters' Laboratories Inc.; G. A. Wintz, Los Angeles

chief electrical inspector; E. E. Carlton, electrical engineer, California Division of Industrial Safety; Arthur C. Veit, Los Angeles County chief electrical inspector; E. G. Wallenbrock, public relations.

Committee members handling the conference under General Chairman Robert R. Procter, Larsen-Hogue Electric Co., and John Horsburgh, Kaiser Steel Corp., are Charles M. Tabor, Larsen-Hogue, program; Lloyd A. Gates, Department of Water & Power, arrangements; Charles W. Doane, Larsen-Hogue, publicity and attendance; Richard W. Fletcher, Fletcher Electrical Specialty Co., banquet; Paul H. Henrichs, Southern California Edison, table top exhibits; Richard B. Hatfield, Southern California Edison, plant tour; William R. Paluska, A. C. Martin & Associates, finance; and Walter J. Collins, Department of Water & Power, registration.

IES Speakers

Willard Allphin, director of illuminating engineering research for Sylvania Lighting Products, was the February national speaker to make the rounds of the South Pacific Coast Region sections and chapters with a talk on "Discomfort Glare: BCD Appraisals of Luminaire Brightness in a Simulated Office." His tour was arranged by the regional program chairman, C. W. Macy.

In conjunction with the roadway lighting committee, better known as "The Lamplighters," the Southern California Section had an additional meeting in February, at which Dr. H. Richard Blackwell, research professor at Ohio State University and well known for the so-called "Blackwell Research Report," was the principal speaker, with Roy Matthews, assistant traffic engineer, California Division of Highways, as speaker at the afternoon session. Matthews discussed "State Warrants for Roadway Lighting" and Dr. Blackwell "Street Light Research and Its Influence on Future Street Lighting Recommendations."

► **Hawaii Chapter,** International Association of Electrical Inspectors, recently selected W. E. Melarkey, Department of Building, Honolulu, as its chairman; A. O. Clissold Jr., Hawaiian Fire Rating Bureau, vice chairman; and C. H. McAllister, principal commercial engineer, Hawaiian Electric Co. Ltd., as secretary-treasurer. The **Southwest Section,** IAEI, is discussing with the Hawaii Chapter possibility of a trip there in 1962.

"we've come a long way..."

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MARKET DEVELOPMENT

Parade of Progress

More than 250 men and women from electric utilities, manufacturers, dealers and their trade allies attended the Live Better Electrically Women's Conference in Chicago. The 1961 sessions, built around the theme Parade of Progress, were planned under the direction of Marguerite Fenner, director of home economics for Pacific Gas and Electric Co., who is chairman of the FEI's Home Service Committee.

Fenner

Pointing out that the PG and E home economics program employs the mass approach, Mrs. Fenner described the Easy Do Parties, one of 11 lectures offered by the company. A slide program, the parties are built around the booklet by the same name, written by Mrs. Fenner.

It was suggested that kwh use will be increased by encouraging women to entertain at home. The Easy Do Party booklet gives the menus and recipes and "how to do" of putting a party together.

Evelyn Hansen, home service director for Utah Power & Light Co., presented a short demonstration she has developed to show the conveniences and advantages of using an electric dryer. Simple props are used with the script to sell the time and energy saving values plus the improved appearance and greater wearing quality of clothes dried the "flameless" way. She cited a survey made by Ohio State University showing that it takes 28 times as long to hang out an eight-pound load of clothes as it does to put them from the washer to the dryer.

Inland League Elects

A. E. Brown, Spokane, has been named 1961 persident of the Inland Empire Electrical League, succeeding C. A. Pierce, also of Spokane. Other officials named include Earl Stout, Lewiston, Idaho, vice president; H. O. Colburn, Spokane, re-elected treasurer, and George H. Gough, renamed secretary-manager.

Directors include George A. Riggs and Robert Cope, Coeur d'Alene, Idaho; Oliver E. Hanson, Moscow, Idaho; Ralph Llewellyn, Wilbur, Wash.; Melvin Stewart, Lewiston; Lester Barnes, Robert Brandon, Roger Cochran, Gordon F. DeFoe, Lloyd Distad, Kimball I. Jack, Maage E. LaCounte, D. W. Prentice and Philo Smith, all of Spokane.

The group is made up of dealers and distributors in the northern Idaho and eastern Washington area served by Washington Water Power.

Westerner Wins McCall Award

Wanda B. Pinta, senior home economist for the Los Angeles Department of Water & Power, was one of five 1960 Laura McCall award winners. The award was for her leadership in planning and organizing a pacesetting program for the utility's annual workshop for homemaking instructors in the Los Angeles public school system.

Entitled Homemaking Around the World, the workshop reminded that homemaking teachers are influential in preparing students to live in a changing world; showed how to stimulate student interest in their school science courses and offered personal instruction in operation of electric appliances.

► Pacific Gas and Electric Co., **San Joaquin Division,** won the company's Annual Sales Award for 1960. It will retain permanent possession, having won the award previously in 1955 and 1956. A similar award for attaining or exceeding quotas in several new business and promotional activities in competition with other PG and E divisions was won by **Kings District.**

Drive for House Heating

Puget Power & Light Co. has strengthened its bid for home heating customers by offering a cooperative advertising program for Gold Medallion Homes, which require an electric heating system.

Under the program, builders qualify for an allowance of $25 with each Gold Medallion home they complete. Up to the maximum allowance earned by a builder, Puget will pay up to one-third the space cost of advertising that features the "Total Electric" concept. Advertisements must be approved by Puget.

As an additional help to builders, Puget has prepared a series of suggested advertisements. It also provides site signs, Open House directional arrows and Gold Medallion literature. It has asked the Washington Public Service Commission to approve a special electric rate to Gold Medallion builders during the period they are drying out their electrically heated homes.

When a Gold Medallion model home is being displayed and a builder agrees to build 10 Gold Medallion homes in that area, Puget will advance up to $250 for advertising.

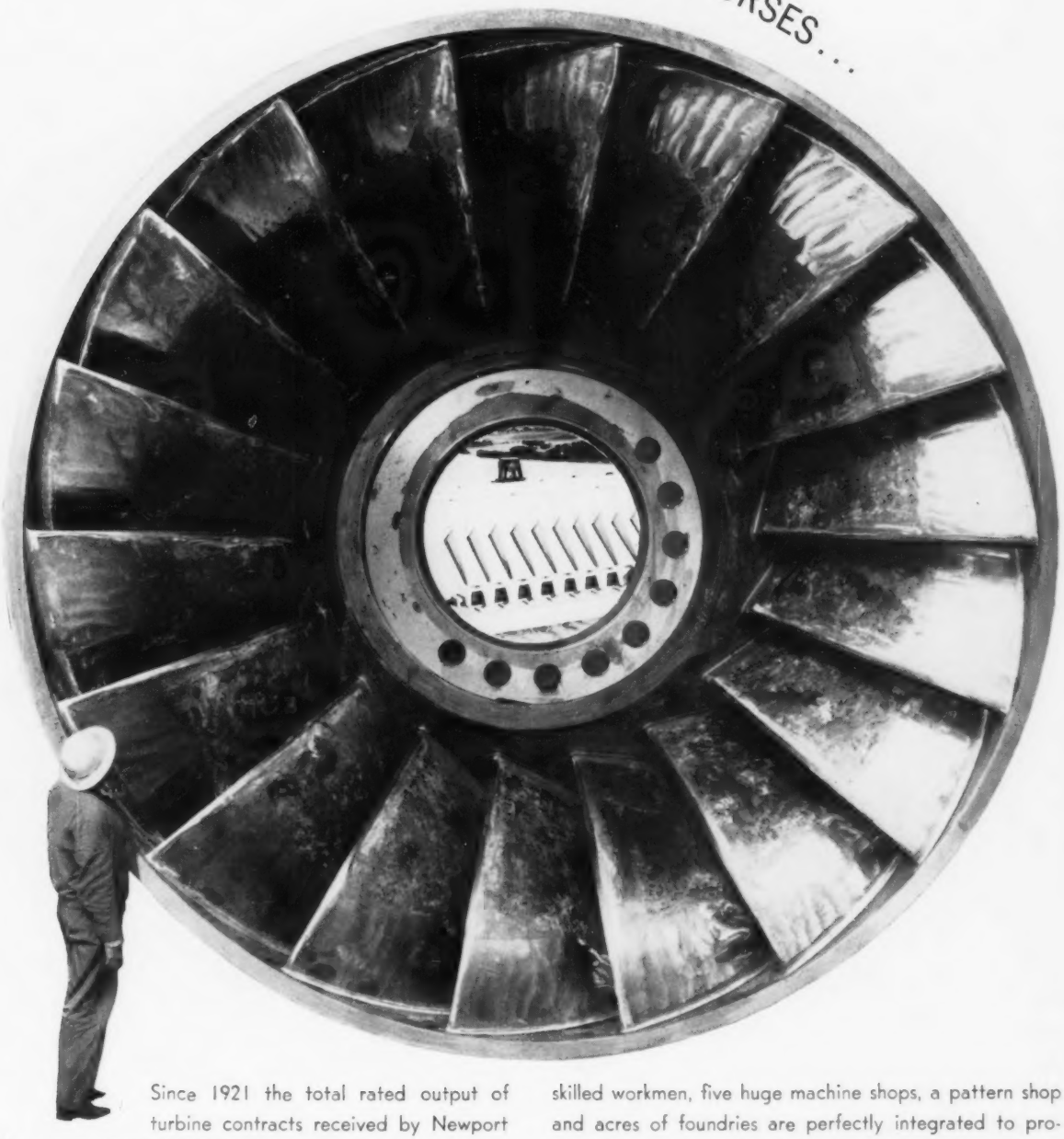
As of Jan. 1, the utility had numbered 46 Gold Medallion homes. The number will increase significantly this year because the Tamarack multiple residence development now under construction on Mercer Island includes 122 Gold Medallion units. Believed to be the nation's first Gold Medallion multiple residence development, the Tamarack apartments will include G-E electric heat cable in the ceiling, as well as range, refrigerator, water heater and waste disposers. Some of the larger units will be equipped with dishwashers. An electrically heated swimming pool is a part of the $2,000,000 development, owned by Wertheimer & Associates and J. Ray Heath.

A survey last year showed that more than 19,000 living units in Seattle and its suburbs, 7% of the total number of homes in the area, are heated electrically. This is an increase from 2.3% four years ago.

Puget Power's advertising allowance is designed to meet competition from suppliers of oil and natural gas, who make subsidies of more than $100 available where their heating units are installed.

"Company's finest for 1960" was the designation given the sales force of Southern California Edison's Montebello district, winner of the perpetual President's Trophy. Here President Jack K. Horton presents the trophy to District Manager L. E. Theaker at a sales meeting in Los Angeles. Edison again led the United States in number of Medallion Homes signed up during the year. The company has maintained first place for the three years the current Medallion Home program has run

NEWPORT NEWS HARNESSES 12,000,000 HORSES...



Since 1921 the total rated output of turbine contracts received by Newport News exceeds 12,000,000 horsepower. The Niagara Project, Grand Coulee, Hoover and Chief Joseph are but a few of the installations for which Newport News has designed and built such equipment as hydraulic turbines, valves, gates and penstocks.

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Precision

How Precision's exclusive qualities make multiple lighting control **99% fail-proof**

This engineer uses a jeweler's glass for his final inspection of every Precision photocontrol. Other Precision engineers use ageing chambers, comparators, endurance and hardness testers, oscilloscopes and weatherometers — plus devices originated by Precision for "breakdown" testing of lighting controls — to insure Precision performance at sixteen separate quality control points in our labs.

It is their attention to perfection that makes Precision photocontrols so nearly fail-proof that Precision-equipped multiple lighting systems need only 1% controls replacement in any given year. That is a fact, proved on the lines of major utilities a half million times every day. This perfection results from built-in Precision distinctions that set this control apart from all complex, old-style photocontrols.

Superior materials

Precision uses the industry's largest gold electrode cadmium sulfide cell and gives it total area exposure since both shading and shielding reduce the efficiency of any photocell. Precision makes and uses the only bimetal switch metallurgically-balanced specifically for lighting control. Then Precision adds special pre-fabrication techniques possible only in the world's largest laboratory devoted entirely to multiple lighting controls: measured-atmosphere ageing, heat treating, electronic-measurement of switch calibration accuracy. No other company can invest so much skill in **every** control.

Advanced engineering

Precision gave multiple lighting its "reliability breakthrough" five years ago and continues to lead the field with the only control designed, engineered and developed for one purpose — precise regulation of artificial lighting twice each day through rigid and unfailing response to natural light levels. Other controls are adaptations from obsolete tube-type controls containing up to 18 fragile components. Precision controls have only 2 components. Precision engineering eliminates all inherent fail-out hazards of capacitors, contact balances, magnetic relays, rectifiers, sensing flexible leads, tubes and printed circuits.

Laboratory production

Precision controls are built entirely by technicians, to insure the human-eye responsiveness with all-weather durability demanded in multiple lighting control. Major utilities in every geographical region of North America have contributed field-engineering recommendations during the past four years that have made these controls virtually fail-proof on 400,000 installations. They will utilize the expanded production facilities of Precision to put thousands more of these perfected controls on the line in 1961.

Field service engineers

Because Precision controls are used on more different installations than any other tubeless control, our field engineering representatives have unique experience in automatic control of multiple systems under all conditions. They are your ablest advisors in matching this perfected control to your most specific demands of weather, surge, lightning or light levels.

Write or wire today for data and quotations.

PRECISION MULTIPLE CONTROLS, INC. • Ridgewood, New Jersey

The difference between night and day

For phone number of closest representative see advertising index in back of book.

ELECTRICAL WEST
VOL. 126. NO. 3 MARCH 1961

THE MAN IN THE MIDDLE

The most pleading need for public enlightenment today is the fact that America will become a second-class nation unless American business and labor pull together during the '60s. If this happens, American labor will be forced to a lower living standard by the economic pressures of foreign competition. Business will fare better. The auto industry, for instance, is spending hundreds of millions abroad in '61 for new facilities, which will employ foreigners and pay handsome profits. It's labor that's caught in the middle.

The problem is one created by John Doe himself. He wanted the Jap radio, the German Volkswagen, the Italian sewing machine, the Scotch whisky, and he bought them. He didn't stop to think that **products imported are jobs exported.** One day John—if he continues at the present rate—will export his own job. He'll go on relief, but relief means taxes and taxes will make the remaining industry less competitive with products from abroad.

World commitments will force us to continue the purchase of foreign products. What is wrong is the notion that we can buy low-priced foreign goods and at the same time produce high-cost products. We have to sell as much American goods abroad as we buy foreign goods or we are in trouble.

Conclusion: American business is going to have to sell John on the idea that he can, indeed must, join hands with his company's management to achieve personal security.

Nursing old bruises and prejudices won't solve the problem. Many businessmen admit that the loss of the working man's loyalty to the unions was a failure both in management's vision and willingness to tell its story.

Needed: New approaches to the problem of measuring the value and adding incentives to jobs. We need a tangible method for workers and unions to measure their effort and compensation. Where there has been real effort to measure, and willingness to pay, there have been few failures. The electronic industry is rife with examples. We know what costs are necessary to compete in the world market. With leadership in engineering, new tooling and willing workers, there are few areas where success will be denied.

Many of today's union policies do not serve John Doe. These are the unions whose demands have **created** unemployment. They are encouraging more doles for the unemployed rather than constructive efforts to create jobs by becoming competitive. Nor do we subscribe to pump priming or presidential manipulation of labor-management negotiations even if they are aimed at making American products more competitive. What's needed is plain talk, not master planning.

Business today has the opportunity to serve working Americans by showing them how determined, hard work by both is the only route to security for either. In our mind this is an obligation.

There is no segment of America that can take pride in watching us get beat in industrial competition. There is no segment that will not be partially to blame if we do.

POWER FOR PARKS

From information supplied by the National Park Service, Western office of the Division of Design and Construction, Electrical West brings you this hypothetical story of how it's done

One of the West's richest resources is its bounty of natural beauty. Protecting and developing the national parks and monuments is the responsibility of the National Park Service. Development of the park areas requires power utility service which meets three standards.

1. Service by the most economical method.
2. Preserving the natural and historical features.
3. Necessary development for the enjoyment of people.

The following hypothetical example will illustrate how the electrical needs of a developed area in a national park are obtained in conformance with these policies.

Steady growth of travel to hypothetical Big View National Park has necessitated the opening of a new portion of the park for campgrounds, concessioner facilities and interpretative facilities.

The Park Service staff has decided that Sun Meadow is the area to be improved. This location was formerly occupied by a patrol cabin at which the ranger used an 800-w gasoline generator for lights and radio operation. Clearly, a new power source will have to be developed. The site is 15 miles from a power line operated by the Hipot Utility Co., with two other suppliers in the area, but more distant.

The general nature of the development, its location and motif are determined. Routes of approach and circulatory roads and trails are then tentatively agreed upon.

This is followed by "horseback" estimates for the cost of facilities, roads and utilities. An agreement is reached with the concessioner pertaining to developments – hotels, stores, service stations, etc. – to be constructed by him.

When a date has been established for completion of the facilities, the regional office enlists the services of engineers from the design and construction office (Western office of the Division of Design and Construction in San Francisco, or EODC in Philadelphia) to analyze the needs and to predict electrical energy requirements. Landscape problems relative to erecting utility lines both within the development and between the development and commercial sources are discussed by the planners and engineers.

In this instance, park representatives contact the interested power companies, outlining the needs for services and the limitations that will be imposed upon its operation.

ELECTRIC POWER CONSTRUCTION GUIDES

The following guidelines pertain to construction practices.

Underground Installations

From the aesthetic and reliability standpoint underground construction is preferred. However, costs or damage to important parks and geological features sometimes precludes its use. In the case of high-voltage distribution lines, protection of cable from lightning and the remoteness of qualified cable splicers in case of trouble must be given careful consideration. Where underground distribution is used, pad-mounted transformers are less costly than vaults and are used where they can be located at sites that are not objectionable from the standpoint of park values.

Overhead Transmission and Distribution

Telephone and electrical lines are often times authorized where they can be located in such a way as not to be objectionable from the highways or points of scenic interest. In tree country, vertical construction of open-wire lines is sometimes specified to reduce the amount of clearing required. Careful consideration must be given in cases of overhead construction due to the vulnerability of falling trees and the width of clearing necessary for the utility right-of-way to provide reasonable maintenance and operating costs. Joint construction of telephone and power lines is preferred so that only one clearing in timber country will be necessary. In the location of open-wire or overhead construction, it is desirable to avoid silhouetting against the skyline or cutting across the view of the visitor.

Lighting

Outside lighting, when necessary, is kept to a minimum, not only to prevent intrusion, but to avoid the sharp contrast with the environment. National Park Service intensity standards are being developed for this purpose.

Right-of-Way

National Park Service policy prohibits the use of any of its lands for serving private lands, either inside or outside the park, wherever they can be served from other properties. Where it is necessary to do so, however, public law requires that reimbursement must be made to the government for use of its lands. Park land use must be limited to the smallest extent and controlled in line with the foregoing precepts.

(Since the National Park Service is the custodian of the lands within its boundaries, to preserve them in as natural a state as possible for future generations, a blanket right-of-way easement cannot be given.) The company is asked for a proposal to serve Sun Meadow, which will include a description of the facilities it wishes to install, the points of delivery of service, and any line extension charges. A statement of how these charges would be paid – i.e., what it would cost on a lump sum basis and what would have to be paid on a guarantee basis – is required. The other two power companies, quite a distance from the site, decided not to submit proposals at this point because of the proximity of the Hipot company.

WODC engineers analyze these proposals, comparing them with an independent system using local generation and also with a government-owned distribution system from a common metering point. Comparisons are made to determine the effects of using electricity, lp gas, and fuel oil for such purposes as cooking, water heating and space heating. The results obtained from these studies are reduced to a "present worth" basis. The latter takes into account all present and future, direct and indirect, expenses such as initial costs, administrative costs, taxes paid by Hipot, sinking fund and maintenance of government owned-facilities, savings in other fuels, etc. The results are reviewed by the park and regional officials. In the hypothetical case it was determined that it would be most advantageous to guarantee (jointly with the concessioner) sufficient revenue for 10 years to reduce the line extension charge to one-fourth of the actual cost and to use electricity for cooking, water heating, and air conditioning but to use fuel oil for space heating.

At a joint meeting with the Hipot company, park service planners and engineers review the proposed service arrangements and discuss matters which should be included in the contract, or operating agreement. This is an authority to do business in the Sun Meadow area under the State Utility Commission rules and rates, subject to control by the National Park Service as to the use of its lands. Every effort is made to permit Hipot to construct and operate its facilities in the same manner that the Park Service would do if it owned and operated the facilities.

At this stage of the negotiations it must be decided how this utility may be installed so as to minimize the intrusion upon the natural features and outline for the utility company special conditions that it must meet. (See box on p 53.)

After signing the contract, the Hipot company submits staking sheets and pole construction drawings which are reviewed at the park, regional office and WODC level before approval. Then construction begins and service is available for the facilities when constructed.

SALES PROMOTION AND REGULATION

HAROLD H. HEIDRICK, WILSEY, HAM & BLAIR, MILLBRAE, CALIF.

To people, both within and without the utilities field, the question of regulating expenses for sales promotion is controversial. Opinions run from a 100% laissez-faire approach to the position that a regulated "monopoly" should spend nothing for sales promotion. Who's right?

Sales promotion expenses were brought sharply into focus last summer in the rate increase proceedings of the Southern California Gas Co. and the Southern Counties Gas Co. before the California PUC. A look at the subject reveals some benefits and problems.

Load Factor—One of the benefits of sales promotion is the improvement of load factor. Load factor is an operating engineering fact. Accountants can't find it on the balance sheet but its level is reflected there. In terms of sales it can be defined as the ratio of the average rate of sales to the maximum rate of sales for a given period of time.

If load factor is to be improved, one approach is to sell more energy when demands are low without increasing sales when demands are high. If that can be done, more efficient use of utility plant can be achieved. The idea is not merely to increase sales at any time, but rather to increase them at a time when such an increase will improve the operating efficiency of the system.

Good Will—Some authorities believe that a monopoly, especially a utility one, need not worry about good will. Let us ignore the monopoly and examine the good will. Where good will exists, it is faster and easier to obtain rights-of-way, building permits, street opening permits and such other permits necessary to provide utility service. Delays in such matters tend to slow the rendering of service.

When funds are scarce, people may have a tendency to delay paying a bill due a utility that makes no effort to encourage good will. Such delays can affect the amount of money necessary to keep in the cash drawer for current operations. There are impressive engineering, operating, management and financial reasons for maintaining and improving good will. But they are difficult to evaluate.

Cost of Money – Experts in the financial field say that public education is important to the cost of money. They reason that faith develops upon knowing a company. For an investor to have faith in a corporation he must know the corporation. It takes more than a monthly bill and a smiling meter reader for people to get to know a utility. Sales promotion offers the customer an opportunity to know the utility. Consequently the public will feel encouraged to invest in the utility, with a corresponding lower cost of money.

Competition – Utilities feel that they must meet competition from other utilities. For example, utilities use sales promotion to establish a favorable load in new housing projects. In one subdivision, a utility company gave a check to the land developer for meeting certain load conditions. The developer endorsed the check to a competing utility serving the same development as payment of excess footage costs since the load to be connected to the competing utility was not sufficient to provide the necessary extension of plant under the free footage allowance in the prevailing extension rule. Question! Does the consumer pay for the check that was originally drawn?

This and other questions have been inciting a number of keen minds to find better solutions for sales promotion problems. The benefits from sales promotion expenses by utilities can be found. **The difficulty in their evaluation causes problems.** Sales promotion is a utility's cost of operation that might well be termed a thinking man's expense.

CUSTOMERS AND USE UP AGAIN

Western utility executives report results of 1960 loadbuilding activities; tell plans for 1961 cooperative sales programs

Continuing their upward trend customer and consumption figures for electric utilities of the West climbed to new highs in 1960. This was brought out in reports from 75 executives responding to ELECTRICAL WEST's annual questionnaire on sales accomplishment.

The answering group, which represents 98.5% of the West's electric meters, has 9,478,415 customers. Executives representing 97% of the total meters reported 9,039,894 customers in last year's survey.

Average annual residential consumption ranged from a high of 15,653 kwh to a low of 2,384 kwh. Of the answering utilities, 45 were above the national average use, 3,682 kwh per customer, and 24 reported average residential consumption of more than 7,000 kwh. Only 3 reported a drop in residential kwh use as compared with 1959.

Of the total customers reported in 1960, 8,068,065 were in the residential classification and 1,223,949 were commercial and industrial users.

Only six utilities reported losses in total customers served and nine experienced decreases among residential users.

Substantial customer increases were reported also in the commercial and industrial classifications. The three utilities serving more than 100,000 commercial and industrial customers took good strides in this field. Pacific Gas and Electric Co. was up 4,161 to a total of 272,501. Southern California Edison Co. added 1,975 for a total of 180,398. Los Angeles Department of Water & Power gained 3,364 to serve 145,109 commercial and industrial users.

Three other utilities reported more than 40,000 commercial and industrial customers on their lines: B. C. Electric, Vancouver, 42,356; San Diego Gas & Electric Co., 41,229; Public Service Co. of Colorado, 40,808.

In response to increased activity in promoting electric heat, this service is contributing a greater share in loadbuilding. The table on this page shows heating load added in kw during 1960, with a comparison with the 1959 figures for those who also reported on this activity in 1959.

Last year's appliance sales in utility service areas are listed on pages 58 and 59.

Judging from advance reports on 1961 sales programs, utilities of the West plan an active loadbuilding year. Following are a few of the comments made by executives answering the questionnaires:

Alameda Bureau of Electricity expects to emphasize heat in 1961.

Arizona Public Service will again run three major promotional campaigns—clothes dryers, refrigerator-freezers, ranges.

B. C. Electric, Vancouver, will put greater emphasis on home lighting and on electric cooking in areas where it does not serve gas. This utility reports that about 9,100 of its residential customers are in New Westminster, which is served indirectly.

Burbank plans to increase its promotion of heat pumps and electric heat of other types to offset summer air conditioning peaks. It now helps with the cost of wiring for an electric dryer and for conversion of a free standing to a built-in range as well as for a water heater and initial range wiring.

Idaho Power will continue emphasis on electric heat, air conditioners, air cleaners, dishwashers, dryers and other major appliances.

Heating Load Added in Kilowatts

	1960	1959
Alameda PU Dept.	760	600
Arizona PS	12,000	
B. C. Electric, Victoria	492	476
California Oregon Power	15,000	12,800
California-Pacific Utilities	765	695
Chelan County PUD	3,217	4,200
Clark County PUD	16,004	13,260
Colorado Springs PU Dept.	50	
Eugene W&EB	18,188	17,452
Grays Harbor County PUD	4,583	3,089
Hill County Electric Co-op.	185	
Home L&P	43	
Idaho Power	4,500	2,450
Intermountain REA	90	60
Lane County Electric Co-op.	700	
Los Angeles Dept. of W&P	3,160	
Mason County PUD	696	564
Mesa City Utilities	1,000	300
N. M. Electric Service	30	
Northern Lights	400	
Pacific County PUD	1,500	1,275
PG and E	87,800	60,430*†
Pacific P&L	42,277	26,341†
Portland GE	45,000	35,000
PS of Colorado	205	113
PS of New Mexico	150	110
Puget Sound P&L	40,000	35,000
Roosevelt County Electric Co-op.	54	74
Sacramento MUD	2,984	4,405
Salt River Power District	7,750	6,461
Seattle City Light	32,937	30,300
Snohomish County PUD	19,685	13,995
Southern California Edison	22,978**	15,998
Southern Colorado Power	83	
Southern Nevada Power	975	840
Southwestern PS, N. M. Div.	625	473
Tacoma City Light	6,875	6,500
Utah P&L	3,652	1,466†
Washington Water Power	9,800	
Yampa Valley Electric Assn.	190	

* Estimated; † Residential; ** Does not include heat pumps.

California-Pacific Utilities reports that its kwh consumption increased 6% as compared with 1959. The company's cooperative promotional program with appliance dealers will be continued with emphasis on sales contacts through appliance shows and demonstrations, with adequate advertising support. Medallion Home and Housepower programs will be supported through educational and sales personnel contacts with builders and electrical contractors. These groups are finding public demand for electric space heating for homes is increasing tremendously.

Clark County PUD said that appliance sales were up 8% in 1960 as compared with 1959. It will continue promotion of electric heat.

Cowlitz County PUD will put a little more emphasis on dehumidifiers in 1961. Participating dealers sold more than 60 last year. The district will continue its promotion of 20,000-lumen mercury vapor units.

(Story, EWEST, November, p 45.)

New house heating rates have been filed by **Home Light & Power Co.**, which expects more activity in this field as a result.

Kilowatt-hour consumption listed by **San Diego Gas & Electric Co.** was for single-family residential customers. Its TV figure on the appliance sales table includes 1,125 color sets. This year the company is putting greater emphasis on refrigerator-freezer combinations and dishwashers. It plans to key its advertising to three points: (1) sell benefits; (2) tell of low-cost operation; (3) invite action.

Lane County Electric Co-op reports that its county electric association will tie in with national and regional programs of utilities, dealers, contractors and architects.

The Medallion program has shown increased effectiveness, the **Los Angeles Department of Water & Power** says, with quotas substantially exceeded in its 13-week campaign. While tract and individual home construction was decreasing, apartment house construction was on the increase. Medallion apartments accounted for a large percentage of the total accomplishment.

In the existing home market, modernization showed a substantial increase as opposed to the national decline experienced last year.

Business goals for 1961 are considerably higher, with the Medallion quota almost double that of 1960. Goals for resistance heating also have been increased. Emphasis will be on the Gold Medallion.

Refrigeration continues to be the largest single loadbuilding appliance sold in the area served by **Mesa City Utilities.**

With promotional rate of 1¼¢/kwh for space and water heating, **New Mexico Electric Service Co.** will increase its efforts on these units.

Medallion Homes, Housepower, Light for Living and electric heat-

Utility Customers and Residential Consumption

POWER COMPANIES

TERRITORY	TOTAL CUSTOMERS 1960	TOTAL CUSTOMERS 1959	RESIDENTIAL—URBAN & RURAL 1960	RESIDENTIAL—URBAN & RURAL 1959	AVERAGE ANNUAL KWH—RESIDENTIAL 1960	1959	1958	1957
Alaska EL&P	**3,496**	3,372	**2,878**	2,762	**4,440**	4,130	3,960	3,620
Arizona PS	**178,216**	170,438	**148,444**	141,653	**3,958**	3,667	3,567	3,180
B. C. Electric, Vancouver	**294,042**	288,145	**251,641**	246,944	**4,842**	4,769	4,570	4,461
B. C. Electric, Victoria	**55,566**	54,243	**47,778**	46,706	**4,658**	4,445	4,063	3,908
Calgary Power	**112,000**†	105,959	**54,400**†	51,005	**2,850**†	2,602	2,247	2,119
California Electric Power	**112,496**	109,377	**95,320**	92,445	**3,097**	2,760	2,699	2,433
California-Pacific Utilities	**35,753**	35,438	**29,416**	29,133	**6,768**	6,386	6,089	5,895
California Oregon Power	**93,344**	91,589	**75,722**	74,349	**9,783**	9,106	8,633	8,667
Cheyenne LF&P	**17,620**	16,655	**15,629**	14,699	**3,090**	2,834	2,642	2,636
Colorado Central Power	**36,934**	34,024	**32,988**	30,397	**3,225**	3,004	2,822	2,677
Elko-Lamoille Power	**2,732**	2,662	**2,247**	2,179	**2,687**	3,039	2,831	2,685
El Paso Electric	**95,827**	93,307	**84,765**	82,463	**3,787**	3,574	3,553	3,147
Ely L&P	**2,760**	2,807	**2,540**	2,383	**2,384**	2,247	2,162	1,938
Hawaiian Electric	**117,227**	111,378	**99,377**	94,287	**4,920**	4,575	4,393	4,225
Hilo Electric	**17,935**	18,443	**14,368**	14,608	**3,084**	2,877	2,783	2,688
Home L&P	**15,970**	15,330	**12,773**	12,261	**3,502**	3,383	3,210	3,070
Idaho Power	**136,455**	131,302	**113,160**	111,474	**7,527**	7,227	6,959	6,764
Lahaina L&P	**1,461**	1,472	**1,254**	1,265	**3,491**	3,224	3,072	3,204
Maui Electric	**10,549**	10,427	**8,623**	8,521	**3,444**	3,288	3,156	3,084
Montana Power	**151,749**	148,652	**130,025**	127,290	**4,055**	3,981	3,736	3,684
New Mexico Electric Service	**12,000**	11,920	**9,556**	9,569		2,982	2,944	2,715
PG and E	**1,976,575**	1,915,297	**1,628,107**	1,572,610	**3,451**	3,154	3,046	2,923
Pacific P&L	**291,847**	289,511	**251,763**	249,621	**8,198**	7,621	7,047	6,931
Portland GE	**258,652**	251,599	**228,358**	221,977	**9,719**	9,186	8,493	8,422
PS of Colorado	**323,720**	313,743	**281,083**	271,886	**2,993**	2,833	2,649	2,541
PS of New Mexico	**100,759**	97,284	**88,354**	85,288	**2,866**	2,708	2,526	2,332
Puget Sound P&L	**225,242**	218,210	**203,381**	196,828	**8,982**	8,609	7,840	7,642
Raton PS	**3,089**	3,042	**2,400**	2,354	**4,385**	4,160	3,880	3,560
San Diego G&E	**329,113**	315,847	**283,576**	271,845	**3,129**	2,870	2,805	2,752
Sierra Pacific Power	**46,332**	43,735	**39,351**	36,542	**5,552**	5,228	5,050	4,930
Southern Calif. Edison	**1,632,728**	1,570,394	**1,412,367**	1,353,046	**2,639**	2,485	2,360	2,288
Southern Colo. Power	**49,141**	48,172	**43,360**	42,544	**2,717**	2,583	2,460	2,329
Southern Nev. Power	**37,424**	35,021	**30,140**	28,277	**11,467**	10,231	9,860	9,373
Southwestern PS, N. M. Div.	**46,179**	43,903	**39,596**	37,489	**2,992**	2,713	2,644	2,390
Tucson GEL&P	**77,740**	73,696	**67,405**	63,836	**3,548**	3,179	2,966	2,712
Utah P&L	**233,215**	227,189	**205,973**	200,508	**4,470**	4,291	4,128	4,047
Washington Water Power	**148,633**	147,301	**128,459**	127,655	**9,055**	8,855	8,470	8,356

ing will receive major promotional support from **Pacific Gas and Electric Co.** in 1961. The company program has been designed to gain further acceptance of major electric appliances and heating equipment in new and remodeled homes and multifamily dwellings and to upgrade lighting and wiring standards, particularly in new construction.

Reddy Kilowatt, now a trademark of PG and E service, will be a powerful ally in the company's development of local business opportunities for appliance dealers and industry associates. PG and E's advertising in support of appliance dealers will use every promotional mass medium.

A dramatic new TV series, Best of the Post, will be presented weekly to a prime market of 1,616,000 television households in northern and central California. Commercials will give strong convincing demonstrations and presentations in support of appliance retail sales.

Riverside Department of Public Utilities will continue its Medallion program, emphasizing the Gold one. It is also planning an extensive residential lighting program in 1961.

Portland General Electric reports that 1961 will be its first full year of aggressive heat promotion.

Southern California Edison reports that it will stay on Medallion Homes, plus, ranges, dryers, heating, heat pumps and water heaters.

Sacramento Municipal Utility District experienced a 9.7% gain in kwh use. Major promotion in 1961 will be on electric heat. A campaign on window heat pumps is a probability, the district says.

Seattle City Light will continue its electric home modernization program, including payments to customers replacing flame-type stoves and water heaters with electric. It will continue its loadbuilding on commercial electric cooking, water heating, air conditioning, lighting.

In 1961 **Puget Sound Power & Light Co.** plans to tie its principal promotion to the total electric Gold Medallion concept. This special residential promotion will revolve around intensified cooperation with builders and contractors in the way of jointly financed advertising. Trade allies have indicated they will give full cooperation.

Puget is presently examining its commercial rate structure to determine a feasible way to adopt the total electric concept to new commercial establishments. It believes that the concept can be made as attractive to this group as it has been to new schools. The company has contracts with 21 new schools for total electric service and is negotiating on seven others.

Washington Water Power Co. plans greater emphasis in 1961 on air conditioning, garden lighting and electric heat.

Yampa Valley Electric Assn. plans to merchandise laundry equipment, water heaters, ranges, air conditioners and heating.

MUNICIPAL UTILITIES

Alameda PU Dept.*	**16,535**	16,175	**14,808**	14,411	**2,501**	2,396	2,379	2,295
Anaheim Dept. of LW&P	**25,855**	23,474	**22,516**	20,758	**2,650**	2,301	2,054	2,097
Burbank PS Dept.	**37,510**	37,442	**31,215**	31,220	**2,800**	2,620	2,530	2,430
Colorado Springs PU Dept.	**39,432**	38,918	**38,919**	38,428	**2,850**	2,800	2,626	2,525
Eugene W&E Board	**29,088**	27,528	**25,450**	24,230	**13,089**	11,686	10,265	9,908
Fairbanks Electric Utilities	**4,858**	4,582	**4,120**	3,856	**3,013**	3,024	2,647	2,578
Glendale PS Dept.	**53,279**	52,503	**44,816**	44,109	**2,520**	2,352	2,304	2,232
Ketchikan PU	**3,050**	3,271	**2,564**	2,750	**6,575**	6,528	6,900	
Los Angeles Dept. of W&P*	**926,716**	902,663	**778,792**	758,376	**2,495**	2,323	2,270	2,158
Mesa City Utilities	**6,354**	6,014	**5,226**	4,922	**3,870**	3,819	3,548	3,158
Pasadena MU	**50,294**	49,905	**42,662**	42,997	**2,648**	2,455	2,395	2,353
Riverside PU Dept.	**30,946**	29,994	**27,066**	26,097	**3,024**	2,850	2,795	2,760
Seattle City Light	**232,862**	231,948	**208,386**	207,872	**9,133**	8,660	8,063	7,961
Tacoma City Light	**64,315**	63,743	**56,433**	55,993	**9,964**	9,544	8,955	9,040

DISTRICTS, REA'S, COMMISSIONS

Benton County PUD	**10,426**	10,097	**8,900**	8,847	**14,117**	12,062	11,428	11,872
B. C. Power Commission	**84,311**	79,868	**71,396**	67,521	**4,215**	3,904	3,652	3,573
Central Lincoln PUD	**12,406**	11,992	**10,310**	9,922	**11,064**	10,177	9,031	9,033
Chelan County PUD	**16,561**	16,684	**14,022**	14,153	**8,826**	8,424	7,657	7,600
Clark County PUD	**33,609**	32,926	**30,026**	29,465	**11,700**	10,798	9,631	9,424
Cowlitz County PUD	**21,511**	21,260	**19,043**	18,827	**14,578**	13,561	12,136	12,207
Franklin County PUD	**7,743**	7,388	**6,233**	6,001	**11,310**	10,665	9,590	9,806
Grant County PUD	**14,403**	14,064	**11,011**	10,747	**15,633**	15,075	13,486	13,803
Grays Harbor County PUD	**22,270**	21,967	**18,192**	17,959	**10,143**	9,441	8,450	8,320
Hill County Electric Co-op.	**2,026**	2,025	**1,911**	1,915	**8,327**	8,189	7,824	7,463
Imperial Irrigation District	**30,380**	29,831	**23,632**	23,172	**7,294**	6,703	6,694	5,892
Intermountain REA	**7,841**	7,425	**3,624**	3,307	**2,933**	3,540	2,424	2,328
Lane County Electric Co-op.	**5,548**	5,420	**4,970**	4,716	**10,592**	9,817	9,048	9,120
Lewis County PUD	**11,882**	11,788	**10,452**	10,378	**9,250**	8,633	7,918	7,784
Mason County PUD	**6,842**	6,430	**6,174**	5,831	**7,520**	7,486	7,039	7,354
Modesto Irrigation District	**28,479**	27,717	**23,993**	23,303	**4,511**	4,124	3,919	3,755
Northern Lights	**3,737**	3,689	**3,316**	3,217	**5,458**	5,309	4,794	4,472
Pacific County PUD	**7,538**	7,477	**6,130**	6,095		8,967	8,289	8,101
Roosevelt County Electric Co-op.	**2,920**	2,886	**1,798**	1,801	**5,030**	4,697	4,369	4,048
Sacramento MUD	**163,173**	153,920	**142,598**	134,044	**4,193**	3,821	3,597	3,338
Salt River Power District	**91,570**	79,975	**83,953**	73,387	**5,520**	4,900	4,750	4,278
Snohomish County PUD	**62,067**	59,157	**56,582**	53,945	**10,480**	9,725	8,559	8,329
Turlock Irrigation District	**20,811**	20,829	**17,712**	17,316	**5,477**	5,089	4,816	4,574
Yampa Valley Electric Assn.	**4,746**	4,526	**2,737**	2,692	**3,828**	3,391		

*Fiscal year
†Estimated

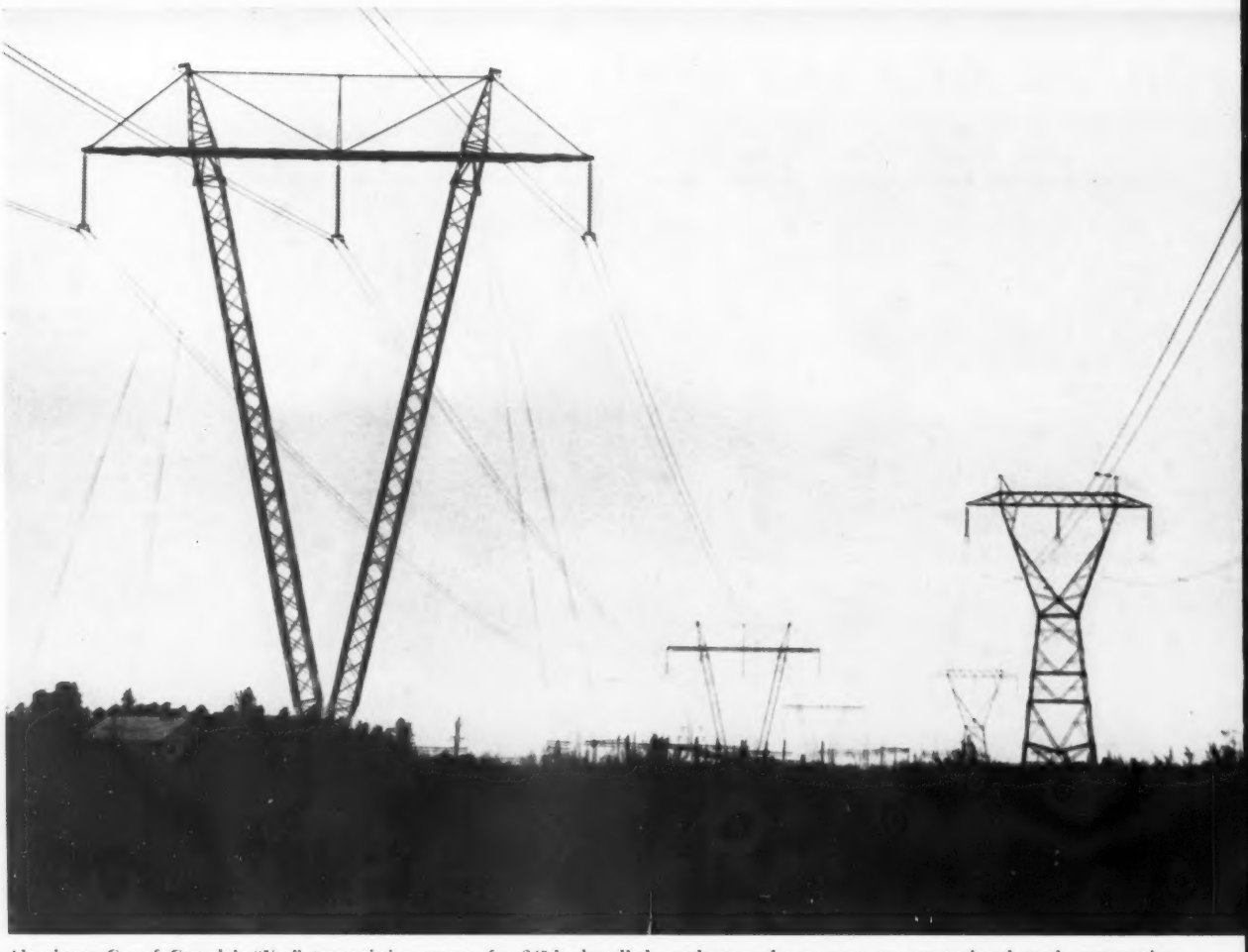
THE 1960 APPLIANCE SALES RECORD

Utility	Customers Residential	Refrigerators	Home Freezers	Ranges	Water Heaters	Washers		Combination	Dryers	Ironers
						Automatic	Conventional	Washer-Dryer		
ARIZONA										
Arizona PS	**148,444**	15,000	4,500	11,500	1,500	13,500	4,000	1,000	2,500	500
Mesa City Utilities	**5,226**	400	200	125	50	200	100	25	100	80
Salt River Power District	**83,953**	6,182	2,167	8,209	1,801	5,389	1,400	542	992	
Tucson GEL&P	**67,405**	2,750	1,000	750	330	4,000	500	330	200	250
BRITISH COLUMBIA										
B. C. Electric, Vancouver	**251,641**	7,810	3,060	7,770	4,530	5,870	1,090	330	5,120	40
B. C. Electric, Victoria	**47,778**	2,509	655	1,782	539	1,304	1,120		690	9
B. C. Power Commission	**71,396**			3,653†	3,202†				1,321†	
CALIFORNIA										
Alameda PU Dept.	**14,808**	325	150	400	10	350	80	50	350	50
Burbank FS Dept.	**31,215**	290	18	140	8	290	26	51	95	10
California Electric Power	**95,320‡**	429‡	13‡	407‡	345‡	259‡			101‡	
California-Pacific Utilities	**29,416**	1,054	682	964	738	1,600	400	135	820	73
Glendale PS Dept.	**44,816**			665	41					
Imperial Irrigation District	**23,632**	1,250	300	300	200	1,200	600		120	
Los Angeles Dept. of W&P	**778,792**	64,122	5,803	7,500	1,800	44,700			4,872	
PG and E	**1,628,107**	117,395	40,276	83,393	15,123	118,008†		13,293	48,930	
Pasadena MU	**42,662**			605	60					
Riverside PU Dept.	**27,066**			940	17					
Sacramento MUD	**142,598**	13,173	3,332	9,774	1,585	15,696†		2,160	9,595	
San Diego G&E	**283,576**	21,800	6,000	2,050	2,275	22,500	2,300	1,325	2,800	
Southern Calif. Edison	**1,412,367**			35,000	9,600					
COLORADO										
Colorado Central Power	**32,988**	450	400	1,800	0	450	75	100	416	
Intermountain REA	**3,624**	108	12	136	22	100			46	
PS of Colorado	**281,083**	25,700	4,700	8,700	2,000	24,700	3,200	2,500	7,200	1,200
Southern Colorado Power	**43,360**	1,500	573	820	185	1,827	625	192	546	25
Yampa Valley Electric Assn.	**2,737**	32	25	35	75	52	3	5	31	6
HAWAII										
Hawaiian Electric	**99,377**	13,400	2,379	6,645	7,243	11,397	2,021	463	1,322	
Hilo Electric Light	**14,368**	649	167	337	431	455	300	20	108	10
Maui Electric	**8,623**	665	146	397	380	554	75		48	
IDAHO										
Idaho Power	**113,160**	5,409	4,387	8,260	6,545	10,820		450	5,543	1,900
Northern Lights	**3,316**	20	30	40	150					
MONTANA										
Hill County Electric Co-op.	**1,911**	36	38	30	23	47†		8	35	5
Montana Power	**130,025**	7,450	2,900	5,700	1,348	8,400		782	5,100	
NEVADA										
Southern Nevada Power	**30,140**	2,569	529	1,911	1,326	2,538	115	184	442	52
NEW MEXICO										
N. M. Electric Service	**9,536**	471	296	200	3	596	61	49	141	
PS of New Mexico	**88,354**	5,243	4,675	5,484	317	8,131			1,765	1,464
Raton PS	**2,400**				50					
Roosevelt Co. Electric Co-op.	**1,798**	145	125	53	42	210		31	53	
OREGON										
California Oregon Power	**75,722**	3,278	2,221	3,679	2,910	4,204		489	2,869	
Lane County Electric Co-op.	**4,970**	100	95	150	100	150	50	30	100	20
Pacific P&L	**251,763**	20,350	12,275	17,914	11,021	29,535		2,760	18,249	427
Portland GE	**228,358**	15,000	10,000	11,250	12,000	15,000	1,750	1,750	13,250	
TEXAS										
El Paso Electric	**84,765**	7,429	2,427	2,613	2,261				1,298	
Southwestern PS, N. M. Div.	**46,179**	1,869	1,094	1,173	445	2,247			817	14
UTAH										
Utah P&L	**205,973**	13,351	7,644	13,026	4,257	17,243	3,746	1,504	7,831	1,329
WASHINGTON										
Chelan County PUD	**14,022**	784	315	588	519	693	194	143	274	13
Cowlitz County PUD	**19,043**	780	599	847	1,680	1,071	117	188		
Grays Harbor County PUD	**18,192**			515	523				424	
Mason County PUD	**6,174**	63	40	85	85					
Pacific County PUD	**6,130**	140	100	120	200	200	25	50	150	25
Puget Sound P&L	**203,381**	7,000		10,000	9,000	11,000		1,000	8,000	
Snohomish County PUD	**56,582**	3,000	1,000	3,500	5,000	3,000	1,000	500	2,000	200
Tacoma City Light	**56,433**	6,400	1,900	7,900	5,100	5,500	1,000	2,400	6,800	
Washington Water Power	**128,459**	5,680	3,453	5,573	4,029	6,321	978	765	3,904	
WYOMING										
Cheyenne LF&P	**15,629**	967	479	484	25	1,069	247	117	552	19

*Estimated. †8 months only. ‡Company sales only. [1] Includes conventional. [2] Includes combinations. [3] Includes commercial units. [4] Includes heat pumps.

FOR THE WESTERN STATES AND CANADA

Dishwashers	Food Waste Units	Air Conditioners Central	Air Conditioners Room	Heat Pumps Central	Heat Pumps Room	Radios	Television	Appliance Sales Estimated	Appliance Sales Dealer or Distributor Reports	Utility
										ARIZONA
2,500	3,000	3,000	4,800	1,200	450	21,000	18,000		x	Arizona PS
50	250	350	350	100	25	1,000	750	x		Mesa City Utilities
1,003	1,065	2,880		1,932				x		Salt River Power District
500	300	200	500			5,000	4,000		x	Tucson GEL&P
										BRITISH COLUMBIA
1,030	280		50			18,190	14,670	x		B. C. Electric, Vancouver
102	86					3,006	3,445		x	B. C. Electric, Victoria
								x		B. C. Power Commission
										CALIFORNIA
200	200	10		1		500	600	x		Alameda PU Dept.
44	200	8	310	6	18	360	410	x		Burbank PS Dept.
101‡	51‡	3,000*	3,500*	423*	130*			x		California Electric Power
156	481	90	450	28			2,750	x	x	California-Pacific Utilities
								x		Glendale PS Dept.
150		500	1,600	300				x		Imperial Irrigation District
			11,822				144,800	x	x	Los Angeles Dept. of W&P
39,105	48,485	5,232	18,505	1,888		156,223	176,856		x	PG and E
									x	Pasadena MU
									x	Riverside PU Dept.
3,916	5,492		11,131	82	132		18,473		x	Sacramento MUD
4,000	6,500	516	3,480	221	1,870		42,425		x	San Diego G&E
				788	1,032			x		Southern Calif. Edison
										COLORADO
100	250							x		Colorado Central Power
48	48		9			100	102	x		Intermountain REA
7,900	5,000		3,600				75,000	x		PS of Colorado
383	602		273‡			1,310	2,248	x	x	Southern Colorado Power
15		1	5	0				x		Yampa Valley Elec. Assn.
										HAWAII
1,397	3,500		656			13,500	14,350	x	x	Hawaiian Electric
76	80	5	8			500	850	x	x	Hilo Electric Light
34	77		78	0	0	529	586		x	Maui Electric
										IDAHO
1,993	1,295	20	170	15		8,500	12,000	x	x	Idaho Power
5								x		Northern Lights
										MONTANA
35	5	0	8		0	16	24	x		Hill County Electric Co-op.
1,980			628				15,640	x		Montana Power
										NEVADA
488	794	190	204	1,292	673	4,459	4,024		x	Southern Nevada Power
										NEW MEXICO
95		10	15	1	1		1,171	x		N. M. Electric Service
572	698						7,167		x	PS of New Mexico
									x	Raton PS
3			2	3			102		x	Roosevelt Co. Electric Co-op.
										OREGON
1,525			625						x	California Oregon Power
50	30						90	x		Lane County Electric Co-op.
5,923	1,724		1,893			31,616	30,783		x	Pacific P&L
5,250			1,125	25			18,500	x		Portland GE
										TEXAS
1,329		125‡	656‡	35‡	58‡		12,832		x	El Paso Electric
419		50	164	30	21		3,075		x	Southwestern PS, N.M. Div.
										UTAH
3,995	5,644	316	779	16		19,325	18,694		x	Utah P&L
										WASHINGTON
156	128	28	102	14	0	739	585	x	x	Chelan County PUD
228	476	133		8			1,653		x	Cowlitz County PUD
									x	Grays Harbor County PUD
20							50	x		Mason County PUD
25	20			0	0	150	100	x		Pacific County PUD
								x		Puget Sound P&L
1,500	500	5	15	5	30	2,000	3,000	x		Snohomish County PUD
2,600	1,900	400			35		10,500	x		Tacoma City Light
2,149		229	990				9,215		x	Washington Water Power
										WYOMING
300	194	4	75	0	0		1,338	x		Cheyenne LF&P



Aluminum Co. of Canada's "Vee" transmission towers for 345-kv bundled conductors shown next to conventional steel construction

VEE TOWERS CUT LINE COSTS

HUGH G. JARMAN, CONSULTING MECHANICAL ENGINEER, MONTREAL

Faced with the usual high cost of transmission towers on the new 1,000,000-hp hydroelectric plant of the Aluminum Co. of Canada Ltd. at Chute-des-Passes and the Isle Maligne-Quebec 345-kv transmission line, the company's engineering staff set about to design an all-aluminum tower of radical design—one that could be easily and quickly erected in remote and inaccessible places. Some towers had to be delivered by helicopter as ground transportation was uneconomical.

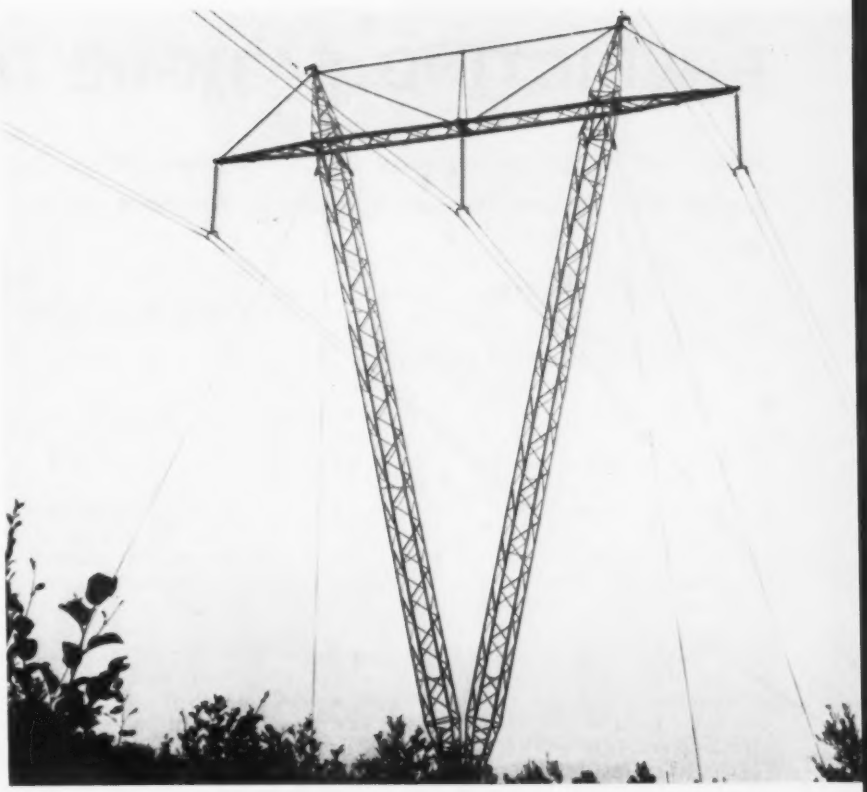
The company designed a "Vee" transmission tower which was prefabricated at its plant, then packaged into bundles that could easily be transported to the various sites, some on stone, others in the swamps. The company called them "V" for victory over high tower cost.

Guyed transmission towers are not new; varied designs have been used in many parts of the world—they have been a standard in Finland since the early 1920s.

However, the use of aluminum transmission towers is relatively new. Alcan engineers designed a tower meeting all conditions in the wilds of the Canadian northland, where weather gives the tower a hard beating and maintenance costs are usually excessive on the former massive towers.

The new guyed aluminum towers were designed with an arrangement of components never before used in tower construction, an arrangement which has proved to be particularly advantageous in rough Canadian

With footings in place, one erection crew, using very light pole line equipment, raised a test tower from a preassembled position on the ground in only seven minutes



terrain. The engineers are certain this type of aluminum tower will win a wide acceptance on a large part of high voltage transmission line construction and that in this field extruded aluminum can be used to particular advantage.

All components of the tower, other than the guy wires and anchorages, are extruded in aluminum B51ST6 (AA351 in the U. S.) with a total weight of about 2,400 lb. In addition to standard angles, two special shapes are used in the tower —a bulb angle for the legs and a lipped channel for the lower chords of the crossarms. These provide maximum strength and rigidity with minimum weight.

Before making permanent installations on their new power transmission lines, engineers carried out full-scale tests on the towers. They applied various combinations of loads up to 22,000 lb at each of the three suspended points. With theoretical design calculations verified, four towers were built under actual operating conditions.

Minor design changes were made as a result of the tests, which still further decreased the weight and improved fabricating and erection procedures. The principal construction change was the incorporation of a pin hinge at the connection of the legs to the crossarms.

The guyed tower principle in itself offers a marked saving over its rigid counterpart. The use of aluminum alloys has further improved this competitive advantage.

The design using Alcan's B51S produced a structure weighing one-third that of a steel structure of similar design. This weight reduction, reducing transportation and handling cost, also permits the use of lighter erection equipment on the field.

Depending upon the height, six to 10 sections, each 21 ft long, are required for each tower. These sections are readily handled by two men.

The old steel towers would require more men and stronger lifting equipment, or the section would have to be made shorter, resulting in longer erection time and higher cost.

Further economies are made in the foundations of each tower. Conventional rigid towers require the setting of four footings with great precision. The rougher the terrain, the more difficult and expensive this operation becomes. While a guyed tower requires five footings, four of these are relatively simple and inexpensive guy anchorages, and no great accuracy is required in placing them.

The advantage of the design may best be judged by the fact that one erection crew, using very light pole line equipment, raised a test tower in seven minutes from a preassembled position on the ground.

The aluminum towers are now in full production and will be used as standard equipment on the company's 3,000,000-hp transmission lines in the Lake St. John's area of Quebec, where severe winter weather is common and towers receive as severe a beating from snow, ice and winds as anywhere in Canada.

The new 1,000,000-hp hydro plant now nearing completion will also use the new towers on its 90-mile distribution system to connect with other transmission lines.

The new towers are also being installed on the Pacific Coast, and it is believed will soon be standard equipment for all major electric power-producing corporations, all of whom have the same expensive erection, transportation and maintenance problems.

Photo below shows the erection of a "Vee" tower at General Electric's Project EHV. Designed by Aluminium Ltd. and fabricated by the Michael Flynn Mfg. Co., the 106-ft tower is said to be the world's largest

PREDICTING FATIGUE DAMAGE

From actual observations at the University of California Test Station we get some idea of the forces at play in Aeolian vibration

ROBERT F. STEIDEL, ASSOCIATE PROFESSOR, ME, UNIVERSITY OF CALIFORNIA

The wind-induced vibration of transmission line cables is the source of numerous fatigue failures of cable strands in service. At present, the emphasis in the field is directed at reducing or eliminating the amount of vibration by the addition of vibration dampers or vibration absorbers to the transmission line, rather than at reducing the induced stress by improved suspension clamp design. At the same time, little attention has been given to the fact that some level of vibration is completely tolerable.

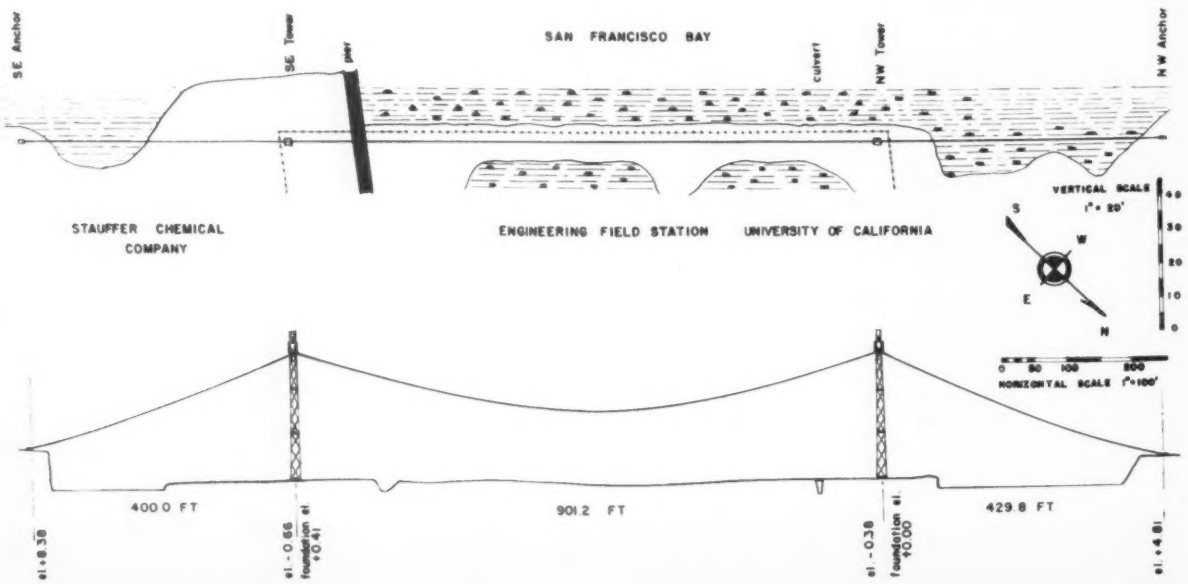
For an average electric transmission line, the cable is stressed in tension and bent to the curvature of the suspension clamp. It sustains a highly localized stress condition due to loading at the clamp. Structural damage occurring from fatigue may result if the stressed cable is subjected to any real degree of aeolian vibration. To prevent vibration, a reduction in cable tension is sometimes used, various vibration dampers or absorbers may be used, or the supported area of the cable may be protected. Each of these alternatives represents an investment that may or may not be justified.

The cause of this wind-induced or aeolian vibration of suspended cables is basically simple. Under certain conditions there is a periodic formation of vortices or eddies in the wakes behind the cables. The appearance of the vortex street in wakes has been well established. Resonance occurs if any of the natural frequencies of the cable coincide with the frequency of the formation of vortices. The resultant resonant vibration, when severe enough, results in structural fatigue failures.

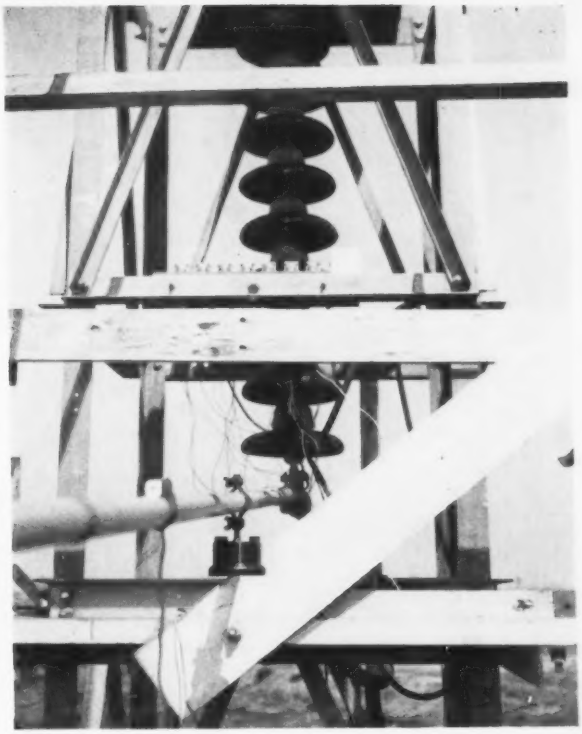
The conventional fatigue diagram illustrates the behavior of single specimens, each of which has been subjected to a great number of complete stress reversals at one amplitude. Ample literature exists on the fatigue testing of cables, as a whole and by single strands. The fatigue diagram for a single strand of EC aluminum wire is shown in the accompanying figure. The data for this work are those given by Tebo of the Hydroelectric Power Commission of Ontario.

An actual cable is subjected to tension and bending as well as highly localized contact stresses in the vicinity of the suspension clamp. As the mean stress increases, the number of stress reversals required to produce fatigue failure decreases.

In actual service a stress-raising factor is introduced to account for nicks or scratches and the corrosive action of fretting or galling. This factor is a function of the geometry and is the ratio of the actual stress to the average stress. In practice, a value of 2 for corrosion and 1.2 for surface scratches would normally be sufficient. The use of such information is conventional where the fluctuating stress amplitude is constant but cannot cover the case of members subjected to varying stress amplitudes without additional knowledge.



Southeast tower of the test span from which most of the measurements were taken to ascertain damage to cable due to vibration



Close-up view of the general working area of the experimental span. Note Jacquet vibration counter suspended from the cable

Repeated stressing is often thought of as progressively damaging. That is, damage due to repeated stressing is cumulative and can be measured by the number of cycles of repeated stress. Miner has suggested that the cycle ratio n/N, where n is the number of cycles applied at a given stress and N is the number of cycles required to produce failure, at each stress level could be used directly to indicate damage. According to the theory of cumulative fatigue, fatigue failure will occur when the summation of n/N equals one.

From the cycle ratios that can be determined, an estimate of the expected life of the cable can be made, or an estimate of the margin of safety for a given life can be made. Using such procedures would place aeolian vibration in line with other engineering problems, and take it out of the "rule of the thumb" class.

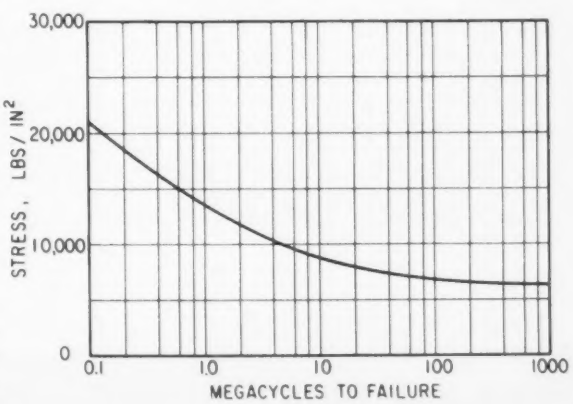
An experimental test span was constructed along the extreme southwestern end of the Engineering Field Station of the College of Engineering of the University of California at Berkeley to obtain experimental evidence of aeolian vibration stresses. In this location, the span was oriented normal to the prevailing winds off San Francisco Bay. These winds are uninterrupted by trees, dwellings or other features likely to cause air turbulence. Two steel towers, 44 ft in height, supported a center span of 901 ft, about average for a standard 230,000-v transmission line. A 795,000 cir mil steel reinforced aluminum cable was used with a span tension of 6,250 lb. This represented 20% of the ultimate strength of the cable. This tensile load was measured with a dynamometer placed at the cable anchor.

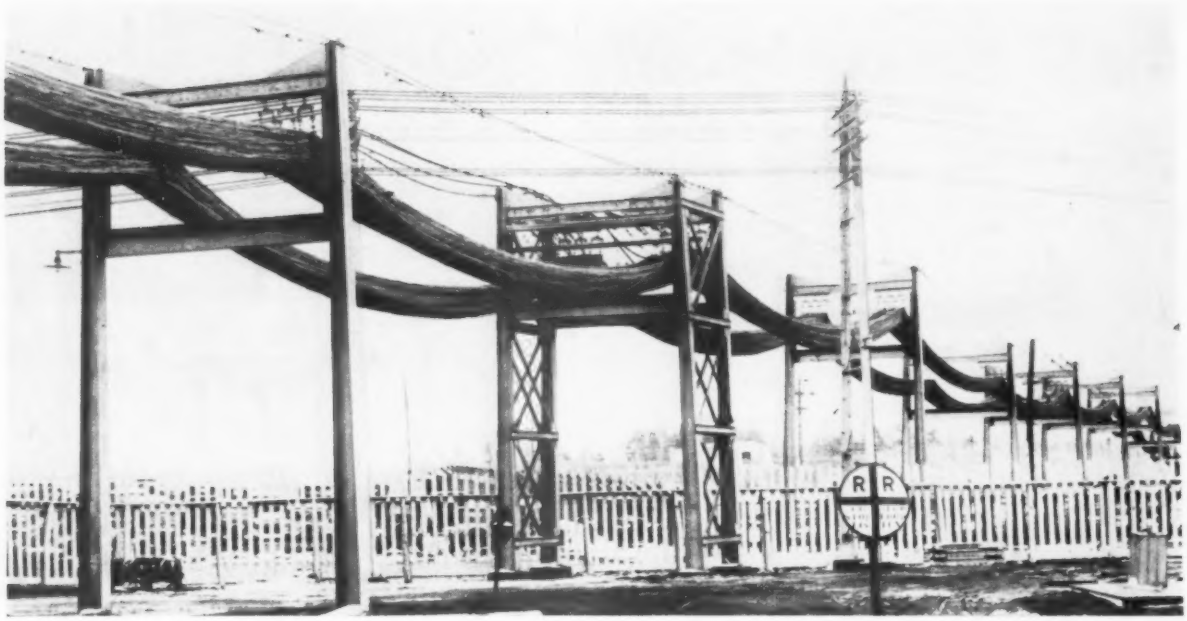
The theory of accumulative fatigue was applied to the observed data of the experimental test span.

For a stress-raising factor of 2, which would account for the corrosive action of fretting or galling, the expected life would be 900 years. For a stress-raising factor of 2.4, which additionally accounts for initial surface scratches, the expected life would be reduced to 30 years. The latter would be about the most severe conditions that could be encountered.

For the stated conditions, it could be logically concluded that no vibration protection would be needed if the experimental test span were in actual service.

Diagram, opposite page, shows the general layout of the test span located along the extreme southwestern end of the University of California field station at Berkeley. From the data obtained, conclusions were drawn as noted in the text and fatigue curves were plotted such as the one shown here for reverse bending of hard drawn aluminum EC grade, 0.105 in. in diameter





This high current d-c bundled conductor installed at Alcoa's Massena Works has 1,892 conductors and is rated 60,000 amp

BUNDLE FOR MORE CAPACITY

A look at the many questions and problems confronting the designer when he begins to consider bundled conductors

RAYMOND E. CAMPBELL, ALUMINUM CO. OF AMERICA

In order to evaluate the desirability of using bundle conductors, an engineer must be aware of both the values of bundle conductors and the problems associated with such construction. Most of these considerations are the same regardless of whether bundle conductors are used for increased current capacity or increased voltage. In general, higher voltages introduce some additional considerations.

A bundled conductor line is a line in which the individual phases consist of two or more conductors. Conductor bundles have been used either to increase the current capacity of a line or to increase the voltage capacity. Although the function of the bundled conductors is different in both cases, there are many physical and electrical considerations that are similar. Bundled conductors, as we think of them today, usually consist of either two conductors in a horizontal or vertical configuration, three conductors in a triangular configuration, or four conductors in a square configuration.

Bundled Conductors for Increased Current Capacity

Bundled conductors for increased current capacity have been used by a number of utilities in the past several years since the phenomenal growth in the use of power has taxed many existing lines to capacity. One way to increase capacity would be to replace the existing line with a larger conductor capable of carrying the power load. This, of course, would involve the scrapping of the original conductor. Another solution is to bundle the existing conductor with a conductor of equal size, thereby doubling the capacity without the necessity of scrapping the original conductor.

One of the major problems associated with bundling a new conductor with an existing line is that of matching sags.

Because of the sag difficulties that could be encountered in bundling an existing line, consideration should be given to pulling in a new conductor of a larger size for half of the line, using the old conductor as a pulling line. The new conductor should, of course, be of sufficient size to carry the required power load. The old conductor that is used as a pulling line is pulled in next to the old conductor on the other half of the line, forming the required bundle. Since both of the old conductors in the bundle have probably gone through approximately the same loading cycles

and have been installed for about the same time, their sag characteristics should be fairly close, and matching of sags can be accomplished without too much difficulty.

If a line is to be built with a single conductor and later bundled, the original conductor may be prestressed during stringing to a tension that will result in a final sag or elongation that is equal to or greater than the permanent elongation that could be expected from either maximum loading or creep.

Because of the problems encountered in prestressing conductors and because of the added cost of going back on a job after a number of years to restring a second conductor, some companies have come to the conclusion that it is a more economical practice to construct a transmission line for its ultimate capacity initially, with a single conductor. The line would then be operated at a reduced voltage until the investment for terminating equipment at the higher voltage can be justified. This method eliminates the added costs of special hardware, extra accessories and spacers needed for bundled conductors.

Closed spring-type spacer designed to maintain separation on two-conductor 460-kv bundle

Bundled Conductors for Extra-High Voltage

The trend to extra-high voltages has caused the greatest interest in bundled conductors in recent years. It has become necessary to look toward voltages above 220 kv to transfer the bulk power loads of today economically over long distances. The use of extra-high voltages permits the utilization of generating sites heretofore thought uneconomical because of their long distance from load centers.

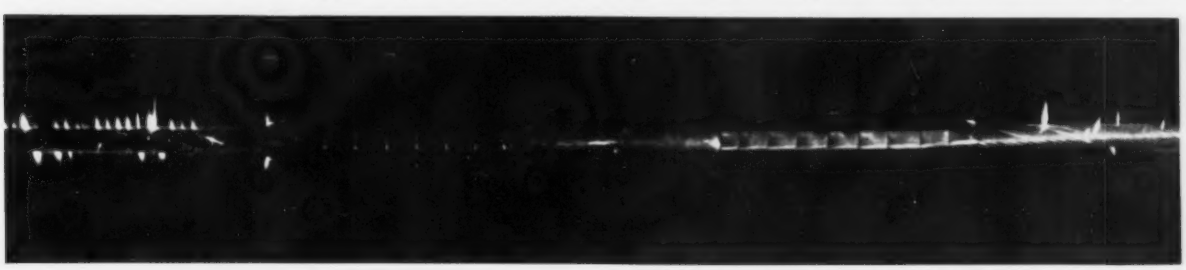
The choice of voltages for extra-high-voltage lines varies throughout the world, and in general is dependent upon the specific transmission requirements of a given system. The world's first extra-high-voltage line, the Hoover Dam-Los Angeles 287-kv line, was energized in 1936. From then until 1952, when the 380-kv Swedish system was energized, this country had the highest voltage transmission system in the world. At present, the highest voltage in use in the United States is 345 kv. Most European extra-high-voltage systems are designed between 330 and 500 kv, with a good many systems designed at a nominal 400 kv. Loads in the United States will undoubtedly require lines of 460 to 500 kv within the next few years and quite possibly lines of from 650 to 700 kv within the next 15 to 20 years.

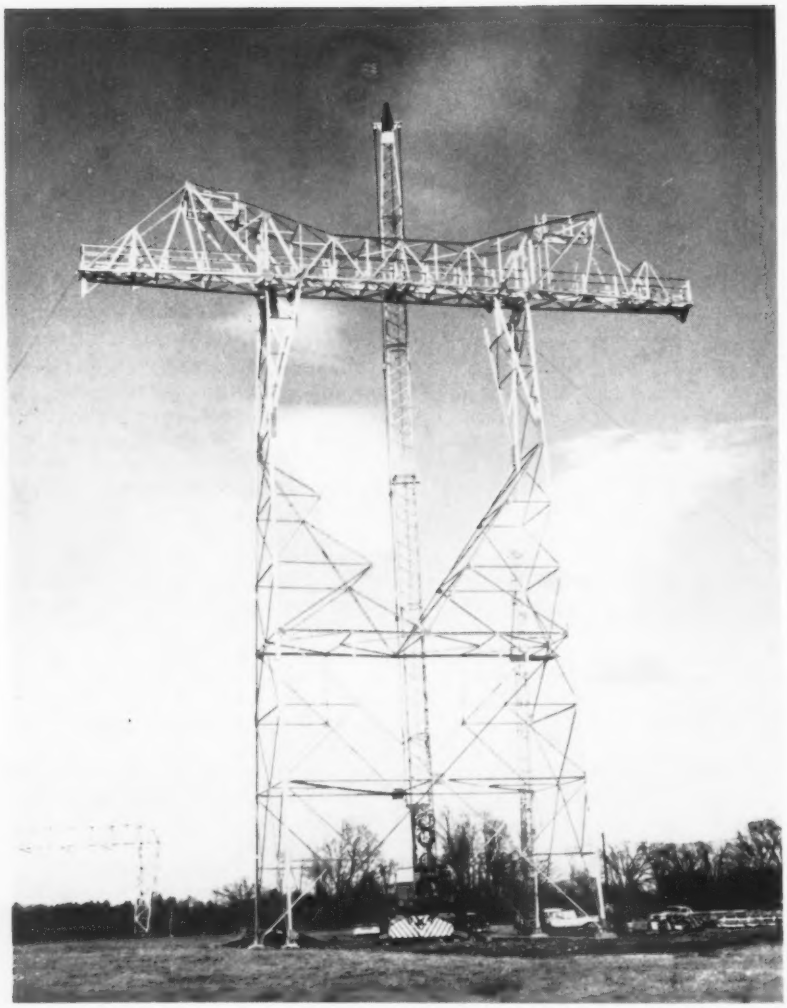
Unfortunately, the blessing of extra-high voltage brings problems. Corona and radio influence (RI) become major problems at the higher voltages. At lower voltages, the conductor diameter is usually controlled by current capacity and will be large enough to maintain a relatively low noise level. At higher voltages, diameter of the conductor is usually dictated by RI and corona discharge. In order to keep the RI level within satisfactory limits, it is necessary to use larger conductor diameters than would be needed to carry the current. For this reason large diameter ACSR, expanded ACSR, expanded copper or bundled conductors have to be employed for the extra-high-voltage systems.

There appears to be a difference of opinion as to what conductor arrangements should be used at the various voltage levels. This is even true for the 330- to 400-kv nominal voltage levels. All of the extra-high-voltage systems operating in the United States today use either large diameter ACSR or expanded ACSR, except for short experimental sections where two-conductor bundles are used. Some systems that are currently being planned and built will use two-conductor bundles. On the other hand, bundled conductors are used exclusively for extra-high voltage in Europe. There seems to be no agreement, however, as to the optimum number of conductors to be used per bundle in the various European systems. In the systems that have been built to date, the French and Swedish lines have two conductors per phase; the Russian lines, three; and the German lines, four.

There are certain electrical considerations that have encouraged some engineers to choose bundled conductors in the 345-kv range, although bundled conductors cost more to install and a single conductor properly designed has a satisfactory RI level. **Bundled conductors have a lower series inductive reactance and shunt capacitive reactance than single-conductor lines.** The result is a lower surge impedance, which is given as a major advantage of bundled conductor lines. In addition, the lower reactance will permit a decrease in the rating of the series capacitors that are normally considered necessary in long transmission lines to increase stability limit. On the other hand, it may be necessary to in-

Time photo of corona test on compression joint for single Plover conductor with an applied voltage of 233-kv line to ground





This aluminum tower is on General Electric's Project EHV where it is hoped more information will be gained on bundle configuration to solve future utility problems

crease the capacity of the shunt reactors that have to be installed on long lines to limit the voltage rise under light loads. The consideration that must be given to these factors, of course, is dependent upon equipment cost and must be figured into the over-all economic analysis of the line.

Corona loss and RI can be made equivalent for a single or bundled conductor line if properly designed. It appears, from preliminary investigation for the G-E extra-high-voltage project, that a practical limit for single conductor applications with present-day equipment may be in the 460-500-kv range.

The consensus of industry at the present time is that conductor accessories should be designed to have a corona starting voltage at least as high as the conductor on which they are used. There is a large AIEE task force working on all phases of corona, radio and TV interference from EHV lines and an early report should be forthcoming.

In construction of all extra-high-voltage lines, special care has to be given not to nick or mar the conductor during pulling. The conductor should be kept relatively clean during the stringing operation. A surface imperfection that could easily occur with standard stringing practices could cause corona discharge at a voltage level well below the design voltage of the line.

Bundled Conductor Accessories

In general, the same types of conductor accessories such as dead-ends, joints, armor rods and dampers may be used on bundled conductor lines as are used on single-conductor lines. However, these accessories must be designed and tested for the appropriate voltage levels.

Spacers for bundled conductors have received a great deal of attention, both in the U. S. and abroad. The purpose of the spacers is to keep the conductors properly aligned and prevent them from slapping together as a result of ice or wind loading. Although spacers, installed at intervals normally found acceptable, will not always keep conductors from coming together during a fault, the spacers should restore them to their proper position without suffering damage after the fault has been cleared. It is necessary that the spacer allow for relative motion between the individual conductors of the bundle during normal operation. Any spacer used must have both good fatigue and wear properties. It is reported that one of the major causes of concern on one of the European high-voltage systems is spacer failure due to wear and fatigue.

It has been amply demonstrated that tapered armor rods provide more than 50% damping on single conductors. They do not contribute as much to bundled conductors.

Bundled conductors may be effectively damped with Stockbridge dampers placed at span ends as is customary with single conductors.

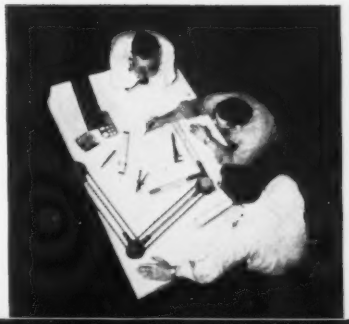
Using normal stringing tensions, horizontal configuration at 16 to 18 in. and with articulated or closed spring-type spacers applied at intervals up to 400 ft, no conductor slapping has been observed with winds up to 40 mph. In an 800-ft span without spacers a 12-mph wind caused conductor contact and in a 1,500-ft span without spacers a wind of only 8 mph gave the same effect.

Conclusion

Bundled conductors may be used successfully to increase current capacity of existing lines. Sag matching problems made it advisable to match old conductor with old conductor when increasing capacity of an existing line. If a line is to be built that may later be bundled, it is desirable to prestress the conductor during installation as well as the conductors that are added at a later date, so that sag matching problems will be reduced.

Bundled conductors will play an increasingly important part in the construction of extra-high-voltage lines. This will be particularly true as the voltage levels increase. Special attention has to be given to the special construction procedure needed in building extra-high-voltage lines.

CONCENTRATION



DUAL VOLTAGE SAVES $15 OR MORE ON EVERY TRANSFORMER

Concentration on one idea has resulted in the new RT&E thoroughly tested and reliable Extern-O-Switch. This redesigned dual voltage switch makes **dependable** cut-over of entire areas to higher voltage at savings of $15 or more per transformer.

Extern-O-Switch body is made of an entirely new compound — a specialized glass-reinforced Polyester thermoset material. It is highly shock resistant and actually extinguishes arcs passed over its surface. Impossible to track, its characteristics are not affected by transformer oil or heat. Electrical insulation levels are increased by 50% with this exceptional material.

The unique externally operated handle reduces changeover to a simple twist of the wrist. Key-type handle cannot be removed unless the switch is correctly positioned. Inside, high pressure contact is assured. New leaf springs behind each contact prevent metal fatigue and provide lasting, positive contact pressure.

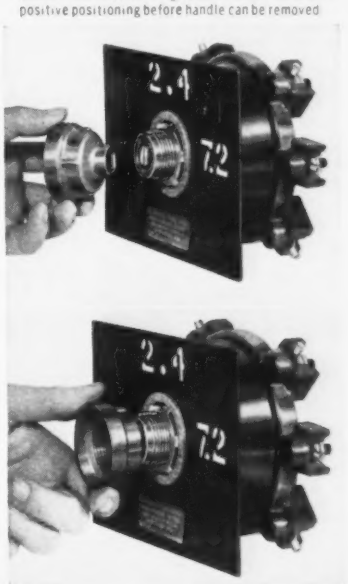
RT&E's concentrated research program developed these improvements to reduce man hours and save money. Protect your investment, look to RT&E — originator of the dual voltage transformer and externally operated switch.

Engineering Talent Concentrated On One Idea — **A BETTER TRANSFORMER**

RT&E CORPORATION

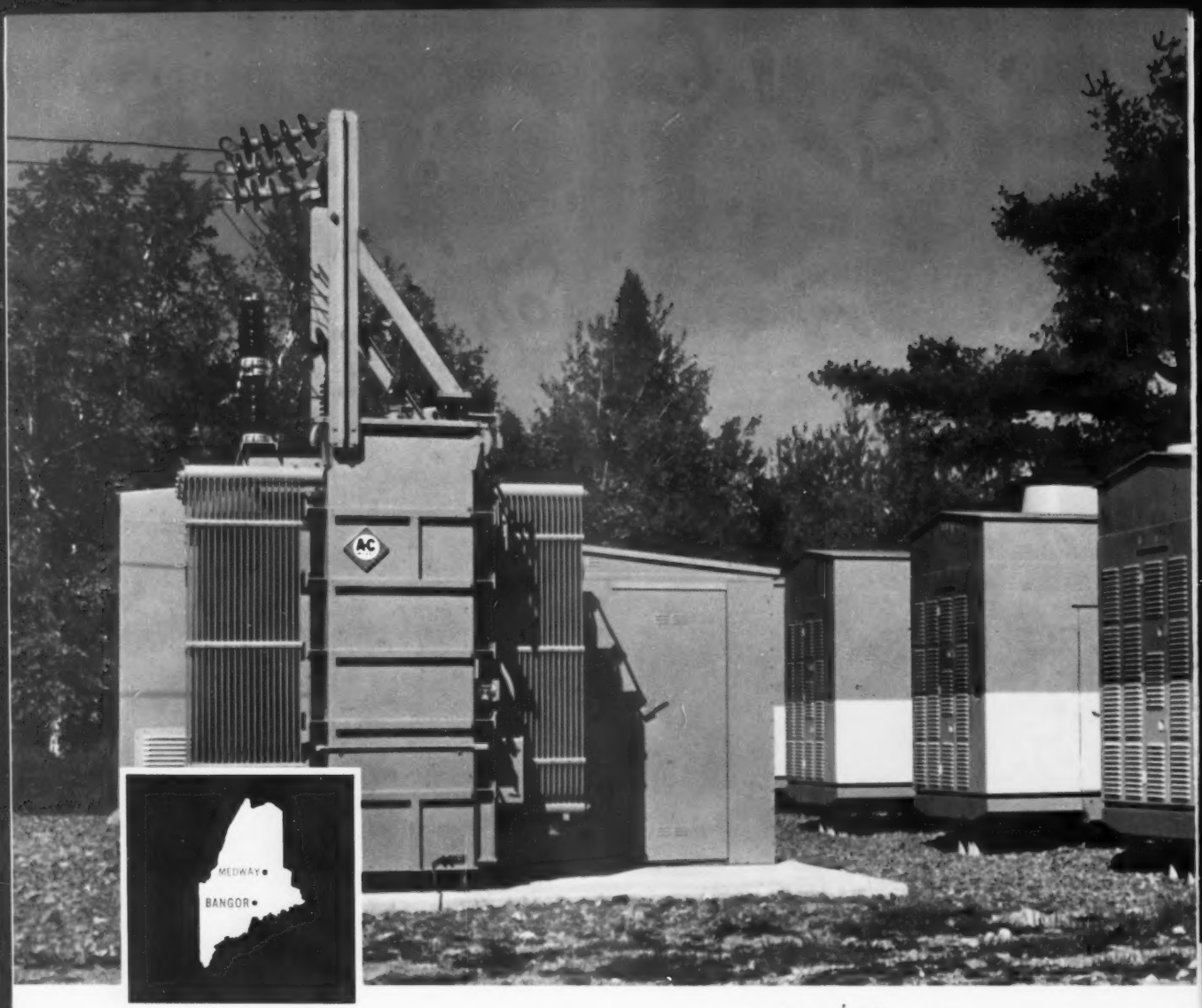
WAUKESHA, WISCONSIN • PORTLAND, OREGON • ARLINGTON, TEXAS

SAFE! Unique keying action between handle and slotted ring around shaft assures positive positioning before handle can be removed.



TI

For phone number of closest representative see advertising index in back of book.



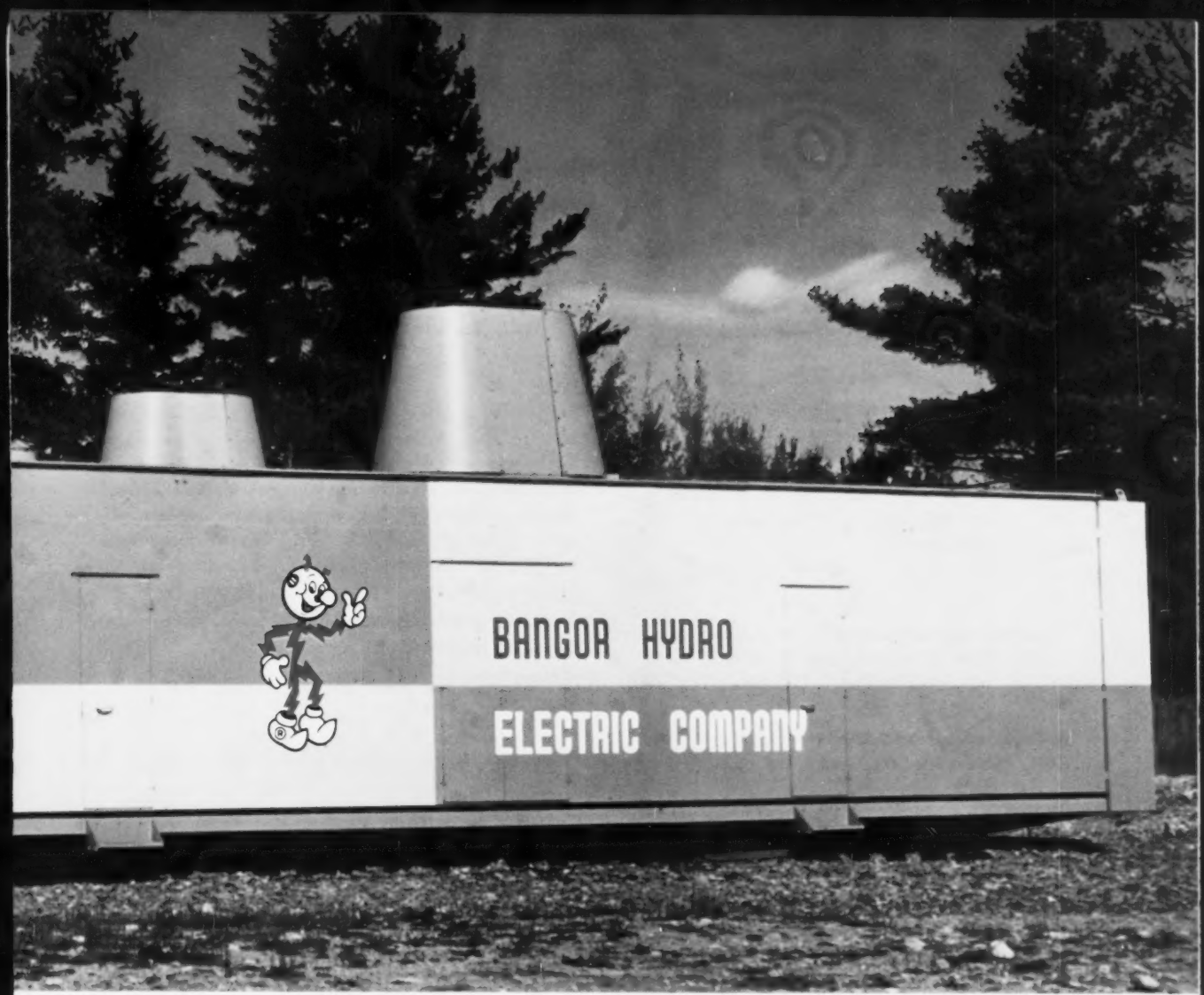
Bangor Hydro-Electric Co. *again* picks Electro-

In the summer of 1958, Bangor Hydro-Electric Company completed an economic analysis of future generation requirements on its system serving four counties in eastern Maine. With load growth averaging approximately 8,000 KW per year, Bangor Hydro-Electric studied three alternate methods to provide increased capacity for a six year period beginning in 1960:

1. Addition of preferred standard steam plants of 22 MW in 1961 and of 33 MW in 1965 or 1966.
2. Addition of a peak-shaving steam plant in 1961 and a preferred standard steam plant in 1963.
3. Addition of Diesel "end-of-the-line" peaking units in 1960, with similar installations in 1961 and 1962, combined with a preferred standard steam unit in 1964 or 1965.

Conclusions drawn from this study showed large savings could be realized with peak-shaving equipment. The Diesel Plan #3 showed the greatest savings by a considerable margin, varying from $100,000 to $790,000 per year.

ELECTRO-MOTIVE DIESEL PLANT—The initial Diesel peaking unit has been installed at Medway, Me., to provide "end-of-the-line" area protection and peaking service. The 8,000 KW Plant is remotely controlled from the hydro station. To provide area protection, the Plant starts, synchronizes and goes on line, in less than two minutes. Bangor Hydro-Electric picked the Electro-Motive Peaking Plant to produce adequate capacity for its system at lowest possible costs, while improving service reliability in remote areas.



Motive Peaking Power for maximum savings

SECOND ELECTRO-MOTIVE DIESEL PLANT—*The success of the first Electro-Motive Plant at Medway led to the order of a second 8,000 KW plant to be installed in the southern area of the system. Due to be operating by the Fall of 1961, the new plant will also provide additional peaking capacity along with protection for another "end-of-the-line" area.*

FLEXIBLE AND RELIABLE—The inherent design characteristics of the Electro-Motive Equipment at Bangor Hydro-Electric that make it ideal for peaking and area protection, also make these Plants ideal for many of your system requirements. With Electro-Motive Equipment, you get fast start for spinning reserve, automatic dead load pick-up for area protection, remote control for peaking service, portability for simple installation, and freedom from damage to components caused by rapid thermal changes occurring from start to full load.

Electro-Motive Peaking Plants, available in sizes ranging from 2,000 KW to 10,000 KW, permit the most economical and efficient peaking operation, and provide for expansion at the lowest possible cost. Ask your Electro-Motive representative for complete details. 61-U-9

ELECTRO-MOTIVE DIVISION · GENERAL MOTORS

LA GRANGE, ILLINOIS

In Canada: General Motors Diesel Limited, London, Ontario

Count the things that change for the better

when you move up to a TOTAL-ELECTRIC GOLD MEDALLION HOME

(It costs so little to live better electrically)

"In our new Gold Medallion home, we get so much more of what we're really *living* for," says Mrs. Nowers. "I have more time for my family and for my community work, and I'm a much better home manager since we moved in. A home without everything electric would seem old-fashioned to me now. I'll never go back."

And these are the reasons why:

1. Flameless electric heat. "It's like living in mild sunshine," says Mrs. Nowers. "Our walls and drapes stay remarkably clean."

2. A flameless electric range. "So cool and *fast*. And no other way to cook is nearly so clean."

3. A flameless electric oven. "The same good things can be said about my electric oven. In addition, the juice stays in the meat because I cook with heat that's moist, not dry."

4. A flameless electric dryer. "My clothes dry even sweeter and fluffier than they used to outdoors. I don't get any baked-in wrinkles, either."

5. A flameless electric water heater. "We get all the hot water we want, quickly and inexpensively," says Mrs. Nowers.

WHAT IS THE "MEDALLION HOME" AWARD? It is an award given only to the one new home in five that is electrically up-to-date with ample outlets, circuits, major appliances, switches and lighting. When a new home meets Medallion requirements you know it offers: *a clean, flameless, electric kitchen,* equipped with major appliances; *plenty of "housepower"*—modern wiring to handle today's and tomorrow's appliances; *abundant lighting,* planned for comfort, convenience and beauty.

Medallion homes are available in nearly every price range and location.

When the future is all-electric, why buy anything but a Medallion home?

SOUTHERN CALIFORNIA Edison COMPANY

Home of Dr. and Mrs. Walter J. Nowers, Palos Verdes Estates, California. Earl R. Mason, A.I.A., Architect.

ELECTRICAL WEST
MARCH 1961

CONTRACTING & CONSTRUCTION SECTION

STATISTICS / COSTS / PROPOSED PROJECTS / NEW PRODUCTS / NEWS

LATE NEWS FLASHES

Uniform Wiring Code Endorsed

After two years of work to coordinate the thinking of all inspectors in southern California as well as the affected electrical industry to produce a uniform wiring ordinance that all will accept, the committee headed by Barney Alverson of San Bernardino submitted the proposed draft to the Southern California Chaper at its January meeting and had it heartily endorsed. It is now to be printed by Building News and copies of it will be available at the March 22 IAEI meeting in San Diego's Kona Kai Club. Although approved by the chapter, the uniform code has yet to be individually adopted by ordinance by the cities and counties in the area. Some 22 have indicated a desire to do so in the interest of uniformity for electrical rules throughout the area. Los Angeles, which has a "lengthy hand-tailored code," however will not do so.

Lighting Maintenance Troubles Aired

Ballasts that blow, outdoor fixtures that take off in the wind, and similar practical realities that face the maintenance contractor after the glowing new fluorescent lighting job has been running for awhile were the subjects of round table discussions at the Western Region meeting of National Association of Lighting Maintenance Contractors at San Francisco's St. Francis, Feb. 20-21. The legal aspects of leasing lighting, the sales approaches to maintenance contracts, and organization aims and program, were also strong items on the agenda. National President Mel Galbraith, regional Vice President Bob Merriam of Denver and Ed Creed of Cleveland came West for the meeting. Bill Abrams of Eveready Electric, San Francisco, received support for an association stand on accessible fusing of fixtures. Lease-Lite put on a demonstration of its automatic fixture washing rig for plastic panels. Red Lindsay of G-E, Nela Park, spoke.

Continued on page 78

Page 91 NEW PRODUCTS
ESTIMATOR'S GUIDE
99 PROPOSED WESTERN PROJECTS
96 READER SERVICE SECTION

UNECONOMICAL LOAD TURNS SIGNAL LIGHT ON

Now—Westinghouse TL load indicators for 10 through 50 kva transformers

**simplify system load management . . .
fit 90% of existing transformers**

Why wait for a voltage complaint to tell you about excessive overload?

Hook up a new Westinghouse TL load indicator right on the outside of the transformer.

Then when there's an economically significant overload, the signal light turns red. (A brief peak overload *doesn't* turn the light on.)

Who determines what overload is excessive? *You* do. The Westinghouse TL load indicator comes calibrated for recommended transformer loadings. But you can set the overload limit higher or lower.

Cost? $10 if you install it. When you buy a new Westinghouse transformer, a TL indicator, factory-installed, costs only $6.

Using Westinghouse TL load indicators, you change out your transformers at the most economical point. There's a model to fit every pole-type transformer, 10 through 50 kva, made since 1935. They give you the simplest, cheapest way yet devised to keep a check on your non-CSP transformers, and manage your system with practically no transformer overload problems.

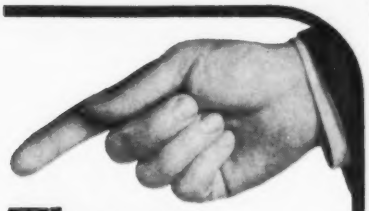
Your Westinghouse sales representative has complete technical details. You can be sure . . . if it's Westinghouse. J-70952

Westinghouse TL load indicator installs with simple hand tools in minutes. No internal connections.

Westinghouse

When this advertisement ran in February 1940, the Kerite generator leads had been operating 30 years. And they were still operating without failure when the turbo-alternators were dismantled in 1955 .. for a total of 45 years of perfect cable service.
BE GUIDED
by facts, not claims
by service records, not initial tests
by experience, not prophecy—
The 11,000 volt generator leads on these Turbo-Alternators of the 59th Street Power Station of the Interborough Rapid Transit Co., New York City, are all single conductor braided
KERITE CABLES
INSTALLED IN 1909, 1910, 1911
They have all given and are still giving continuous and satisfactory service.
THE KERITE INSULATED WIRE & CABLE COMPANY INC
NEW YORK CHICAGO SAN FRANCISCO

For phone number of closest representative see advertising index in back of book



These KERITE cables

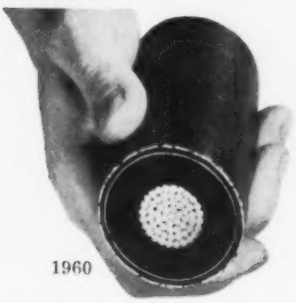
. . . were designed without any of the accurate methods now used to determine conductor size. They were overloaded throughout their lives, and although they were installed in brass pipes and operated at 11,000 volts, they were protected only with a non-conducting cotton braid.

1909

In 1946, one lead was removed, reeled, and shipped to the Kerite factory for investigation.

In spite of 36 years of thermal abuse, almost constant electrical discharge at its surface, and the physical handling involved in its removal and shipment, the minimum 60-cycle A.C. breakdown was above 90 KV with the average 10 KV higher.

Kerite engineers have pioneered improvements in almost every element of generator cable . . . *but the consistently high qualities and long life of the Kerite insulation remain the same.*



1960

THE KERITE CO.
30 Church St.
New York 7, N. Y.
Sales offices in principal cities.

Motors and Controls—XX

Some Factors Beyond Control

TOM HUGHES, CALIFORNIA DIVISION OF INDUSTRIAL SAFETY

Earlier, we pointed out that after some conscientious application engineer has properly correlated all the factors we have covered so far some one can come along and change the load, change the motor or move a boiler up next to the overload relay, etc., any one of which messes up the whole deal. A good plant engineer can control everything in this line of application from the loading to the proper ventilation of the relays. Such control is lumped under the head of maintenance factor.

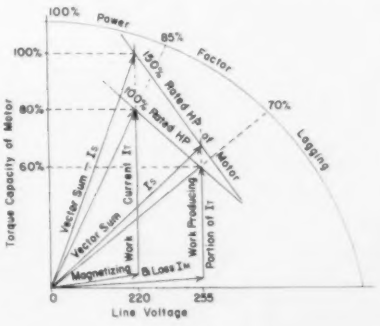
But there are two factors he can't control and they may spell ruin to any number of motors. The first one is wide variations in line voltage. For example: 195 v low or 255 v high. The serving utility is the only one who can do much about this factor.

As everyone is fully aware, with lowered voltage we have nuisance tripping and hot spots because the motor draws more than its quota of current. But with raised voltage we have a much misunderstood set of conditions that are tied in with power factor.

Any motor running lightly loaded will impose a poor power factor on the feeder or line serving it. The larger its distributed inductance (because of size or greater number of poles in a slow-speed design) the more it lowers the power factor on light loading. The torque developed by a motor varies in proportion to the square of the voltage supplied to it. Thus an increase of 25% in line voltage means an increase of approximately 50% in its ability to produce torque.

The result is that a motor which was pulling its full load at rated voltage becomes lightly loaded with the increase in line voltage. And lightly loaded means poor power factor. The reason we are concerned about this effect on power factor is that it utterly confuses this poor overload relay which we said could differentiate between harmful and unharmful overloads. We are not going into the ramifications of power factor and its control. We are already involved in too many aspects for comfortable digesting.

But let's look at the factors involved. All induction motors have



a lagging power factor. The best you can expect is around 90% of unity. The current consumed in the motor is made up of two parts—the so-called magnetizing (known as charging current in a transformer or capacitor) and the working or torque-producing current. The magnetizing current (which supplies all the normal losses) is nearly 90° lagging the voltage curve and is nearly constant in value for a fixed line voltage.

The work portion of the current varies in proportion to the torque being produced and stays closely in phase with the voltage curve (unity pf). The power factor is approximately the ratio of the magnetizing current to the total current (in other words, the ratio of the 90° lagging component to the vector sum of the currents). So we see that the more work the motor does the greater the work portion becomes in proportion to the fixed magnetizing portion and the better the power factor becomes. But we are talking about a motor running at its rated voltage.

Quickly, again, the torque varies in proportion to square of voltage. The total current also varies inversely with the voltage. The magnetizing current also increases as the voltage is boosted. And if the magnetizing current is boosted the losses, such as iron and copper losses, must increase greatly as saturation is approached. The whole state of affairs is highly confusing to the student as well as our poor relay. We have spent weeks trying to find some way to picture all these factors and have finally worked out the representation in the accompanying drawing.

Nothing in this figure is in any correct proportion or drawn to any scale. Naturally these factors are go-

ANNOUNCING

PENGO-Prope

—the most satisfactory pulling line available today!

* GREAT STRENGTH
(9,600 lbs. tensile for ¾" diam.)

* LIGHT WEIGHT
(11.7 lbs. per 100 ft., ¾" diam.)

* HANDLES AND SPLICES LIKE MANILA
in any climate or weather.

* WATERPROOF,
(even salt water) can't mildew; excellent dielectric properties.

PENGO-Prope is a synthetic rope of special construction for pulling line use. Although PENGO has other synthetic and manila pulling lines, we believe PENGO-Prope far surpasses these ropes in cost-saving performance.

PENGO-Miller
LINE STRINGING SWIVELS

Special models of the well-known MILLER swivels redesigned specifically for tension line stringing use.

The result is a reliable, heavy duty swivel of proper dimensions to pass through stringing sheaves and bullwheel grooves easily, without damage.

PETERSEN
ENGINEERING CO., INC.
Santa Clara, California
Phone: AXminster 6-7712

B 10

ing to vary from motor to motor and the torque producing portion of the current is a far greater portion of the total current than we have drawn it. But this was the only way we could get it all in one diagram and picture the relative changes that take place. In motor design books you have to pore over four or five different diagrams to reconcile all these factors.

So, in this drawing we see that the diagonal line (representing 100% loading of the motor) crosses the vertical working current vector at a point opposite 80% of the torque capability when the motor is fed with 220 v from the line. As the line voltage is raised to 255 we see that the magnetizing current increases. Remembering that the torque capability of the motor jumps up as the square of the voltage we see that at 100% rated load it is now only utilizing about 60% of its available torque.

Now suppose we unconsciously load this motor to 150% of its rated capacity. We see that at rated line voltage the poor motor approaches its maximum torque capability or "pull-out stage" (as motor men say). Since the work current jumps way up its power factor improves too. But look at what happens to the same general purpose motor when fed off 255 line voltage and loaded to 150% of rated load.

Since its torque capability has been expanded so far above needs, its work current does not have to expand much to handle this added load and the total (vector sum) current hardly exceeds the total current it had to draw at 220 v just to pull its full load. Looks like we are getting something for nothing, doesn't it. But look again.

The vector sum current is all messed up because of power factor. Look at that long segment of magnetizing current that spells highly increased losses with increased heat —both in the iron and the copper of the motor. But what about this guardian overload relay that the literature tells us can "differentiate between the harmful and unharmful overloads"?

The sad truth is that that remote relay can only sense the value of the vector sum current I_a. It doesn't know anything about the I_m and I_r components and it never heard of power factor. So we see what a mess this little voltage jump makes in all our careful application of running protection. The motor can just be cooking itself on an overload but the overload relay is serene.

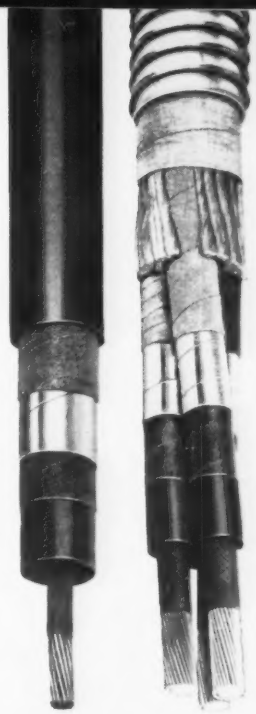
Since the voltage fluctuations also are rough on lighting sources, electronic gear, etc., the plant engineer wants to do something. Well, outside of getting the power company to regulate its line voltage, his only recourse is to get a big synchronous motor and find a steady load for it. Most plants use lots of compressed air and manufacturing plants are using larger and larger proportions of d-c and high-cycle currents for machine tools. A synchronous motor can be used to produce these needs and help stabilize the system power factor and voltage. As a desperate last ditch resort, some people have even floated them on the line with no load connected to them.

Meet in San Francisco

Power & Communication Contractors Assn. came West to San Francisco Feb. 5-7 for its 16th annual convention. It was presided over by Lloyd Jack of Kelloren Co., Appleton, Wis., and attended by some 50 members and associates.

The program dealt chiefly with federal pole line construction for power and telephone lines under REA and U. S. Bureau of Reclamation. Speakers included Ray W. Lynn, chief of Telephone, Engineering & Operations Division, REA, who discussed "Changes in Construction Contract Documents"; Charles R. Ballard, outside plant engineer, REA, who spoke on "Buried Plant Construction Problems—Owner - Engineer - Contractor Relationship"; Robert Welty, consulting engineer, The Dalles, Ore., on "Our Changing Horizons"; B. P. Belport, associate chief engineer, USBR, Denver, on "A Look at the Bureau of Reclamation's Future Transmission Line Construction Program." The latter said the USBR has plans for more than 1,000 potential hydroelectric projects in the Western states, which depend upon congressional appropriations.

A session was devoted to material men's presentations. Gerald A. Petersen, president, Petersen Engineering Co., Santa Clara, and E. L. Bledsoe, Kaiser Aluminum & Chemical Sales, Oakland, were co-chairmen and gave an opportunity to the material suppliers for a brief message. The closing session, under Vice President Marvin Sandidge, included a talk "Recent Developments in the Law," by Elmer Klaprap, general counsel, Employers Mutual of Wausau, Wis., and "Advantages of Insured Warranty Poles," by W. R. Yaeger, consultant, Timber Products Inspection & Preservation, Waynesville, N.C.



How Circle exceeds the specs to give you...

MAXIMUM DIELECTRIC STRENGTH

EVERY order for power cable calls for certain specifications to be met. At Circle, the point is not how well these specs are met – but rather how far *they are exceeded.*

Example: the well-known "double-voltage" test as required by IPCEA-NEMA. The table below demonstrates *one of the ways* Circlesheath Type RR power cable exceeds specs to give users maximum performance. Circlesheath also excels in ozone resistance, long-term stability and other essential power cable requirements.

Power cable reliability is no haphazard achievement. It requires continuous supervision by men who not only care enough but know enough to produce the very best. Specify Circle on your next job – there's no finer cable made.

CIRCLE WIRE & CABLE CORP.
SUBSIDIARY OF **CERRO CORPORATION**

PLANTS: Maspeth and Hicksville, N. Y. **SALES OFFICES & WAREHOUSES:** In all principal cities.
Rubber Covered Wires & Cables • Varnished Cambric Cables • Plastic Insulated Cables • Neoprene Sheathed Cables • "CIRTUBE" EMT

CABLE SIZE	RATED VOLTAGE	DOUBLE AC TEST VOLTAGE	CIRCLE B'KDN VOLTAGE	MAXIMUM STRESS IN VOLTS PER MIL
2 AWG	5KV	28KV	48.3KV	454
1/0 AWG	5KV	28KV	40.3KV	356
500 MCM	5KV	31KV	44.6KV	307

True . . .

photocontrols

are only

one part of

your system

. . . but they may be the *one* part that decides everything. All it takes to keep an otherwise perfectly good street lighting system in the dark (and someone on the carpet) is an "inexpensive", untried photocontrol someone has slapped together just so it would "sell". The worst of it is these "bargains" may work fine for a year or so, and then . . .

How are you fixed for links? Fisher-Pierce Division, Sigma Instruments, Inc., 43 Pearl St., So. Braintree 85, Mass.

FP

FISHER PIERCE

Electrical and Electronic Equipment for Industry, Utilities and the Home

For phone number of closest representative see advertising index in back of book.

LATE NEWS

Continued from p 71

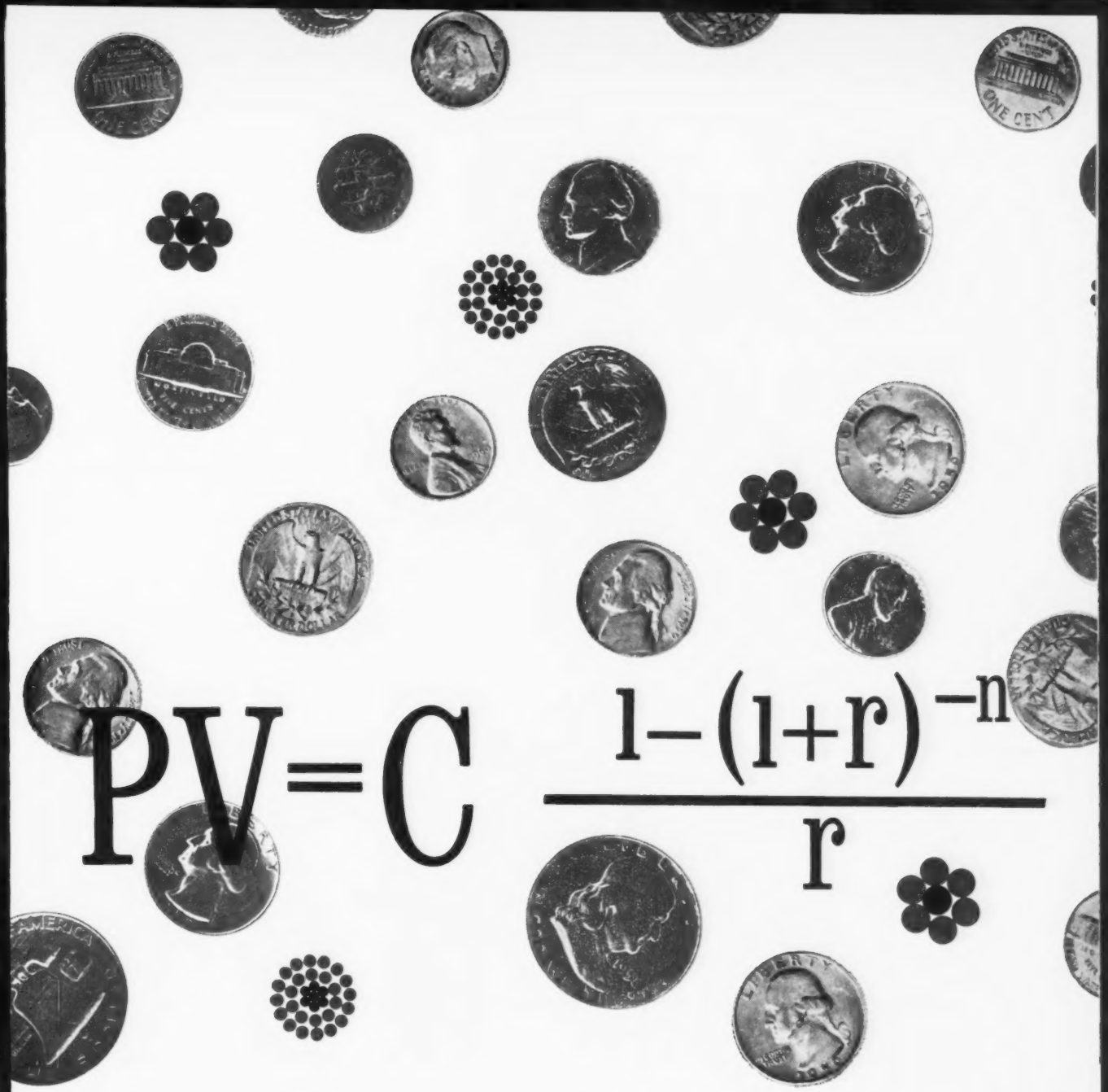
► Eleven bills have been placed before the California legislature, nine of them at the request of Attorney General Mosk, to amend the state's antitrust laws and make them coincide with the national laws. The object is to pursue any violators found guilty of federal violations with a similar case at state level, as well as to catch any violations intrastate.

► William R. Volheye, chief state electrical inspector for Oregon, retires March 31 after many years in the post. The electrical industry in Oregon is planning a big testimonial dinner in his honor March 25 at the Portland-Sheraton Hotel. National figures in the electrical inspection field will attend to add to the tribute to the ardent worker in National Electrical Code and state code.

► Idaho's legislature has before it House Bill 34 to try again to clarify and improve the interpretation of the Idaho Electrical License Law, first enacted in 1947 and amended in 1955. Clarification of fees authorization, definition of scope of contractor and journeyman certification and adoption of the 1959 National Electrical Code, instead of the 1953 Code, are among its refinements.

► Baron Whitaker takes over the chairmanship of the NFPA National Electrical Code Committee from Merwin Brandon, who has held the post since the death of Alvah Small. Whitaker is a vice president of Underwriters' Laboratories Inc.; Brandon its president. Brandon will continue to head the NFPA committee on electric field service. Another change announced by National Fire Protection Assn. is the appointment of Louis LaFehr, chief electrical inspector, Alhambra, and secretary-treasurer of the Southwestern Section, International Association of Electrical Inspectors, as a member of the Electrical Correlating Committee, succeeding W. L. Gaffney, Tacoma, retired.

► Four cases from Western chapters of National Electrical Contractors Assn. will be heard at the Council on Industrial Relations quarterly meeting, Feb. 21-23, at Washington, D. C. They are disputes over wages chiefly that could not be negotiated satisfactorily between the NECA and IBEW in Pocatello, Idaho; Roswell, N. M.; Spokane, Tacoma, and Wenatchee, Wash.; and Sacramento, Calif.



How important is 1% more conductivity?

It can save you up to $100 per mile of overhead conductor.

Compare two conductors—one with a conductivity of 61%, the other, Alcoa ACSR, with a 62% minimum guaranteed conductivity. Assume all other characteristics are equal. Now you can compute the dollar savings per conductor mile as a result of the extra 1%.

How much dollar savings? You can find the long-range answer, using the formula actuaries use to determine present value (PV) of benefits:

$$PV = C \frac{1-(1+r)^{-n}}{r}$$

where C = annual savings in dollars
n = amortization period in years
r = annual interest rate

You can see how important 1% more conductivity is over the life of a conductor. If you took these savings into consideration at the time of purchase, you could actually afford to spend up to 3 cents per pound more for an overhead conductor with a guaranteed 62% conductivity.

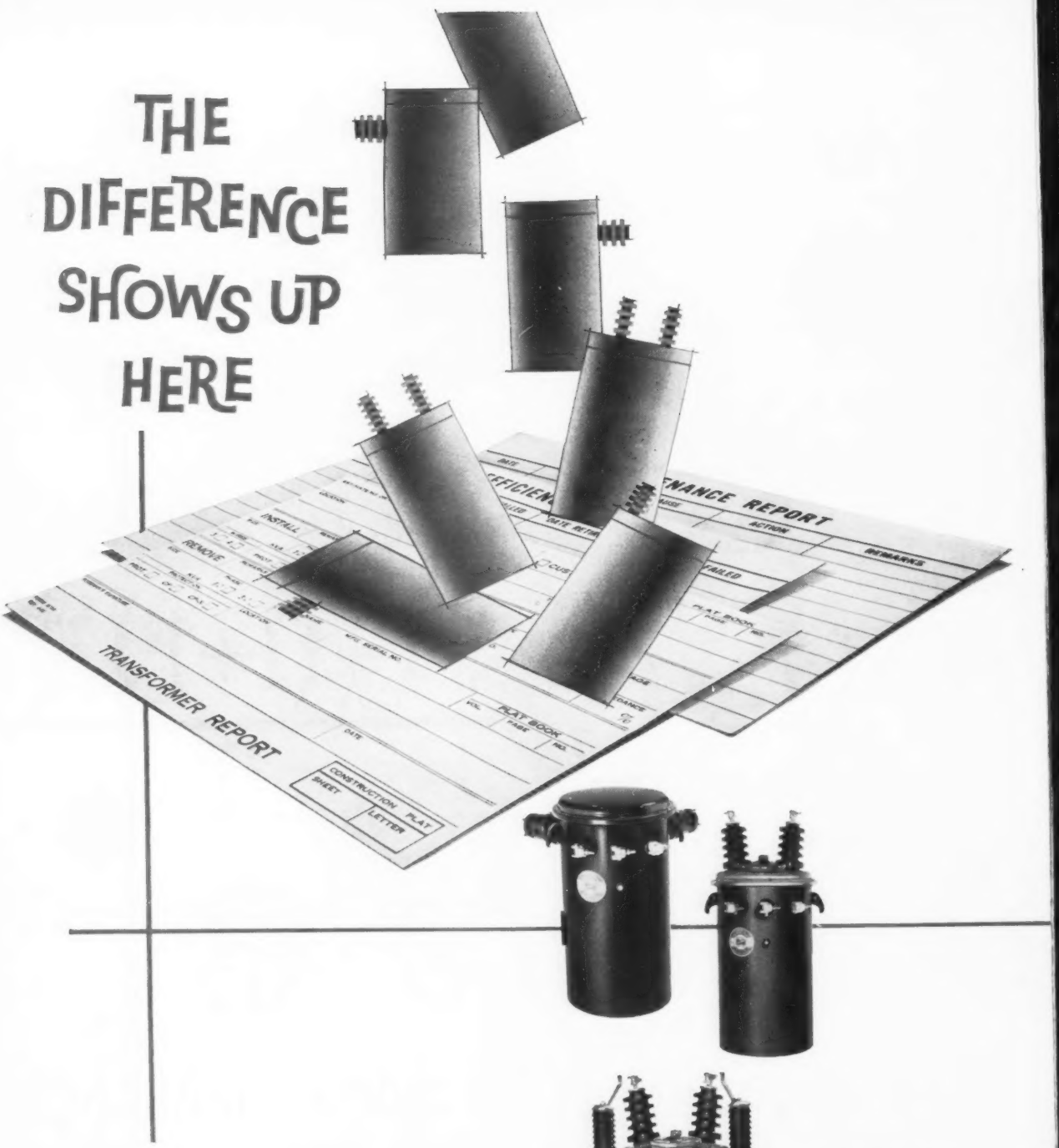
Alcoa gives you this important extra 1%—62% minimum guaranteed conductivity—at no increase in cost.

It's one of many *extras* you get when you use Alcoa ACSR and Alcoa overhead accessories.

Your nearby Alcoa-Rome salesman can help with all your overhead needs. For the name of our nearest representative, write to Rome Cable Division of Alcoa, Dept. 4-21, Rome, N. Y.

ALCOA
ROME CABLE
DIVISION

THE DIFFERENCE SHOWS UP HERE



Since 1896... MORE POWER TO YOU

MOLONEY ELECTRIC COMPANY

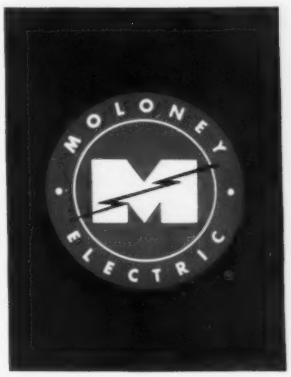
Manufacturers of Transformers for Utilities, Industry and Electronic Applications

FACTORIES AT
ST. LOUIS 20, MISSOURI AND TORONTO, ONTARIO, CANADA

SALES OFFICES IN ALL PRINCIPAL CITIES

For phone number of closest representative see advertising index in back of book.

Your records know the difference between distribution transformers having a marginal design or a single outstanding feature—and distribution transformers having a well balanced design. If these records could speak they would tell you Moloney's Distribution Transformers give the tops in system efficiency, dependability and economy. Check the following Moloney features against the record—see how Moloney Transformers can hold down your costs and give a high rate of return on your investment.



ME61-4

MOLONEY FEATURES	YOUR BENEFITS
Low core loss • Low exciting current Low copper loss	LOW OPERATING COST
Low impedance—good voltage regulation High overload capability	INCREASED REVENUE
Duracoat Insulated Covers • High Impulse strength Designed to withstand full short circuit Extra insulation at all vulnerable points of the coil	FEWER OUTAGES
High strength bushings • Sealed tank-inhibited oil Tough weather resistant paint No external bushing mounting hardware Cover fashioned to shed moisture Heavy gauge steel tank and cover	MINIMUM MAINTENANCE
New shipping enclosure—reduces scrap—facilitates readying for installation Transformer banded to shipping base for ease of handling after enclosure is removed	EASE OF HANDLING
Smoothly contoured hooks prevent sling abrasion AL-CU Connectors • Single bolt handhole closure Insulating cap on sidewall mounted H. V. bushings for clamping conductor without tools	QUICKLY INSTALLED
Low sound level • Dependable service No radio frequency interference	SATISFIED CUSTOMERS

MANUFACTURERS AND DISTRIBUTORS

Antitrust Statements

Charles E. Wilson, former General Electric president, will represent that company in its recently announced cooperative studies to determine whether violation of the antitrust laws by certain employees have been financially detrimental to customers.

In making the announcement, Ralph J. Cordiner, G-E board chairman, said: "We accept responsibility to explore with our customers the implication of these unauthorized actions, which were contrary to our written directive policy 20.5 and reach a mutually agreeable conclusion as to what actions, if any, on our part may be called for in the light of the circumstances."

Calling on company management to make the antitrust law a "living policy in every action we perform," President Mark W. Cresap Jr. of Westinghouse instructed Carlisle P. Myers, general counsel, to set up a new antitrust section within the law department and announced a detailed plan of enforcement within the company to assure future compliance.

Appointed chief counsel in charge of the new antitrust section is Thomas M. Kerr Jr., Westinghouse attorney, who came to the company originally from the antitrust division of the U. S. Department of Justice.

► **Bryant Electric** Co. has set up a Pacific zone headquarters at 1224 Mariposa St., San Francisco, where it has both office and warehouse. The new zone headquarters will handle sales in the Western states including Alaska and Hawaii. **Clyde H. Wood,** formerly marketing manager for Bryant in Bridgeport, Conn., has been appointed Pacific zone manager. Before moving to Bridgeport in 1956, he spent 20 years in Seattle and San Francisco with Westinghouse Electric Corp., where he served as agency and construction manager for the Pacific Coast region. **R. L. Gill** will continue as manager of the company's South Pacific district, with offices at 3310 Leonis Blvd., Los Angeles.

► **Lease-Lite** Corp. has moved its shop and office to a new building that includes its "Litehouse Showroom" of lighting fixtures, for residential lighting as well as industrial and commercial. It is located at 369 W. Portland Ave., San Francisco, according to Larry Creech, one of its owners. This company developed and is manufacturing a fluorescent lighting plastic panel washer for lighting maintenance.

► **Shaffer & Nelson** is representing **Precision Multiple Controls** Inc. in the Northwest, Peter H. Zecher, sales manager, has announced. Territory will include Washington, Oregon, Idaho, Utah and western Montana. The manufacturer, which makes photoelectric controls for outdoor lighting, recently changed its name from Precision Magnetic Controls.

► **R. C. Hammersmith** will be resident manager for **Kaiser Engineers** on the AEC's new production reactor construction project at Hanford, Wash. He succeeds the late **John H. Tacke.** Hammersmith has recently been located in the Oakland home office as assistant manager for construction, industrial construction department.

►**William S. Edwards** has been elected executive vice president and general manager for **Hollywood Wholesale Electric Co.,** President Howard Stultz announced. Edwards has been with the company for 16 years and, for the past year, has been executive vice president. Serving with him is **Edward A. Hall,** who has been with the company for 21 years and is now a vice president and responsible for sales activities. **Theodore Griffiths,** who has been assistant to Bill Edwards, was appointed credit manager and was elected assistant secretary and treasurer. **Jack Bisset,** vice president and assistant to the general manager, will go on a semiretired basis as of March 5. The firm is located at 6820 Romaine St., Hollywood 38, and is a distributor of electrical supplies and appliances.

► **Philip B. Lockwood** has been appointed West Coast branch manager for Chrysler Corp.'s Airtemp Division, with headquarters in Los Angeles.

► **James E. Hall** is now representing the **Brand-Rex line,** American Enka Corp., in the States of Utah and Idaho. His address is 4874 Andlor St., Salt Lake City 14.

► **Eugene T. Hubbard** has been made manager of operations for G-E's test reactor at Vallecitos atomic laboratory, Pleasanton, Calif. Coming from the Hanford plutonium plant at Richland, Wash., Hubbard succeeds **H. T. Wells** who has joined an advanced development project at Vallecitos.

► **John F. Helms** has been made salesman in the northern California area for **EJS Lighting** Corp. He will work in association with **Marc Marcus,** who continues as sales representative in California and Arizona. Helms has been with Incandescent Supply Co. for 18 years.

► **Halo Lighting Products** has appointed two new representatives in the West. The **George Adams Co.,** 1521 N. Black Canyon Highway, Phoenix, has been made representative for New Mexico, Arizona and El Paso, Tex. **Mac Kessler,** 607 Market St., San Francisco, has been appointed its factory representative in the northern California area.

► **K. W. Lockwood Co.,** 1516 Westwood Blvd., Los Angeles 24, has been appointed general sales representative for **William Brand-Rex Division, American Enka Corp.**

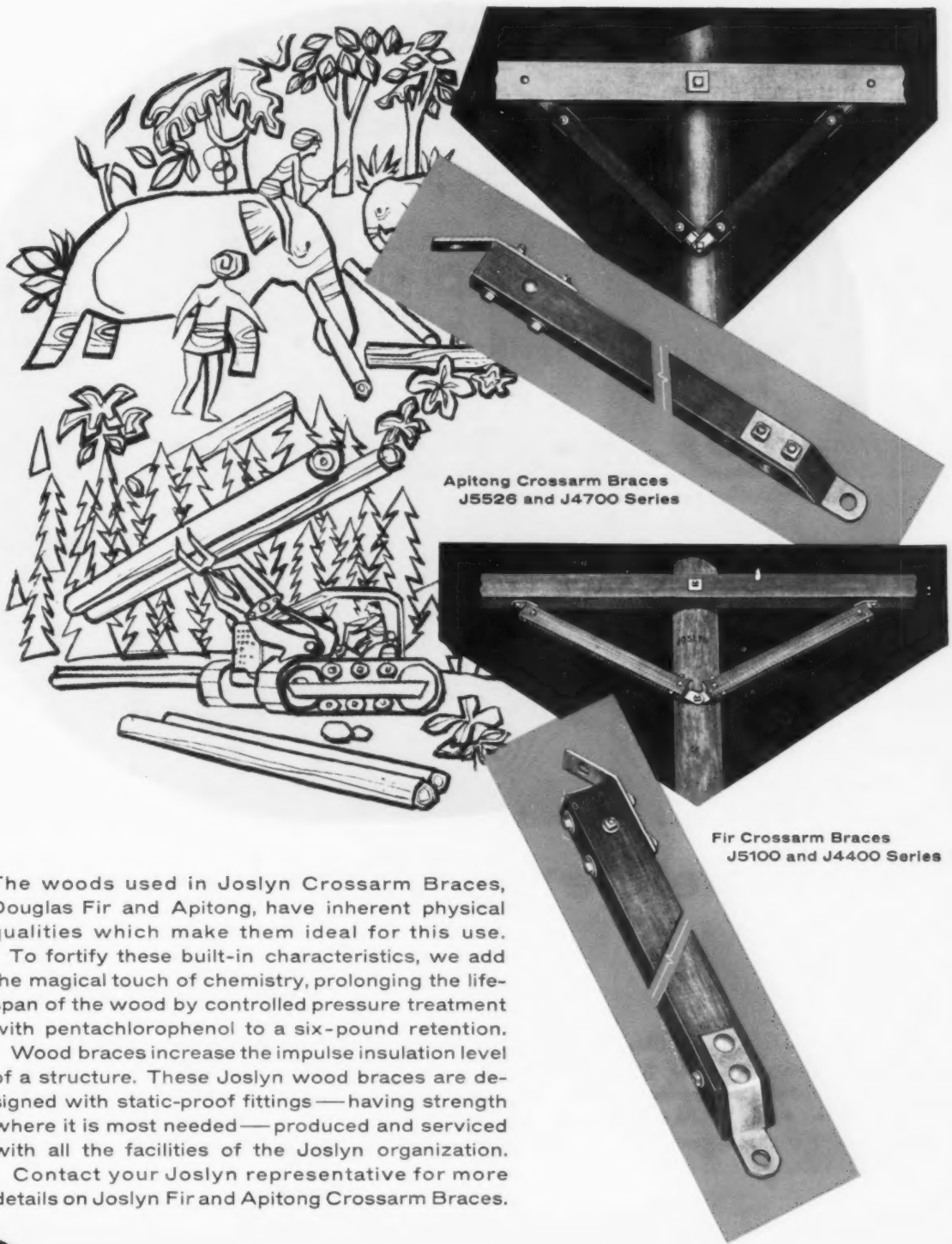
► **Hyster Co.** is building a new general administrative office building at Portland. The two-story structure is scheduled for completion in April. A San Francisco retail branch was established last August in the South San Francisco industrial area.

► **Pacific Electric Motor Co.** each year holds an annual awards dinner to honor its old-time employees. The special honoree at a recent meeting at Claremont Country Club was Keith Noble, vice president of the company, who has completed 25 years with the organization. Likewise honored was Charles Elvin, who has been with the company 40 years. S. E. Tosteson, another 40-year employee, could not be present due to illness. The company boasts that it has 55 employees who have been with the company from five years on up to 40 years. William Boyd is president, James Allen, vice president in charge of construction and the Pittsburg operation, and Mira Holland, secretary-treasurer.

► **T. J. Cope Division** of Rome Cable Corp. has set up a new office at 2937 S. Tanager Ave., Los Angeles 22, Calif., with **Charles H. Neal** as manager. It was formerly represented by Randolph Engineering Corp. Before joining Cope, Neal was the Los Angeles district sales manager for Cutler-Hammer Inc.

WE GATHER WOOD

from the Pacific Northwest to Malaya to the Philippines



Apitong Crossarm Braces
J5526 and J4700 Series

Fir Crossarm Braces
J5100 and J4400 Series

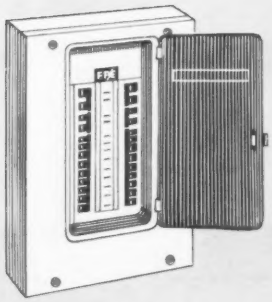
The woods used in Joslyn Crossarm Braces, Douglas Fir and Apitong, have inherent physical qualities which make them ideal for this use.

To fortify these built-in characteristics, we add the magical touch of chemistry, prolonging the life-span of the wood by controlled pressure treatment with pentachlorophenol to a six-pound retention.

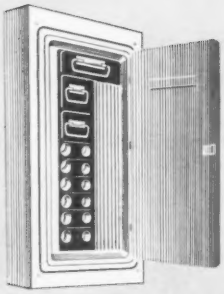
Wood braces increase the impulse insulation level of a structure. These Joslyn wood braces are designed with static-proof fittings — having strength where it is most needed — produced and serviced with all the facilities of the Joslyn organization.

Contact your Joslyn representative for more details on Joslyn Fir and Apitong Crossarm Braces.

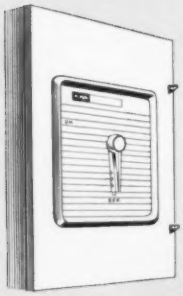
JOSLYN PACIFIC CO., a Division of Joslyn Mfg. and Supply Co., 5100 District Blvd., Los Angeles 58, Calif.



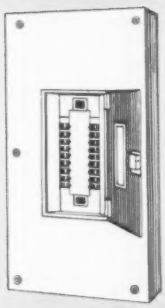
Stab-lok® Load Centers



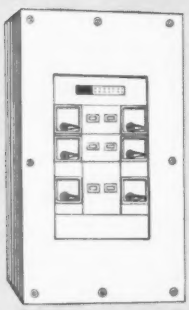
SF Fusible Load Centers



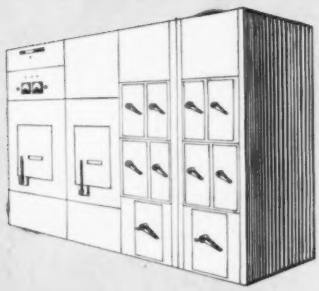
Safety Switches



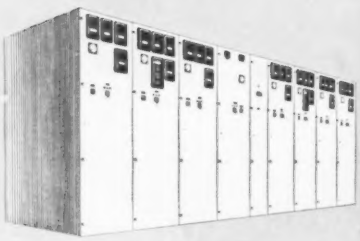
Lighting Panels



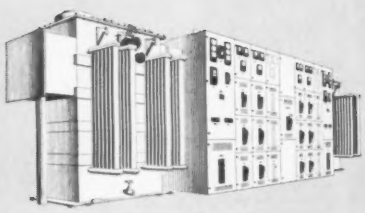
Power Panels



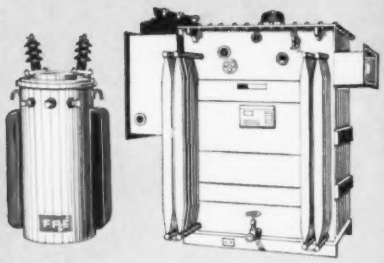
Switchboards



Metal-Clad HV Switchgear



Unit Substations



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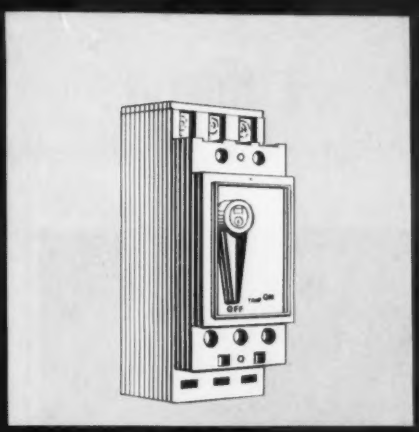
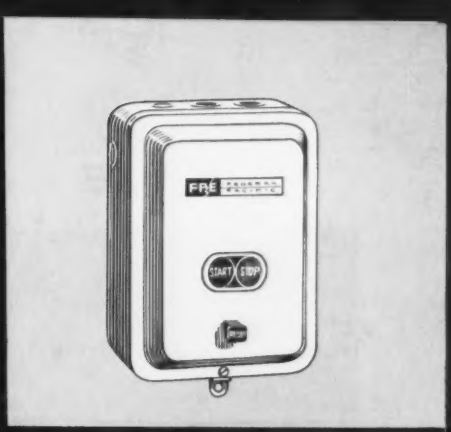
The new FPE Redi-Reference Catalog belongs on your desk if you are an architect or consulting engineer, designer or builder, contractor, distributor, plant engineer or purchasing agent. Within its pages you will find a complete line of electrical products ranging from the smallest home fuse to the largest power circuit breaker. Outstanding examples: the revolutionary Rotary Handle circuit breakers, setting new standards of safety and convenience; compact and easily-operated "A-Plus" safety switches; Dual Element fuses with 100,000 amperes interrupting capacity; the industry's only

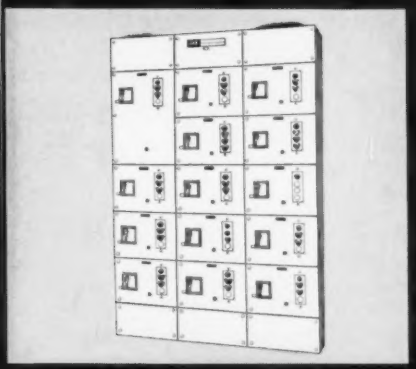
Economy Fuse



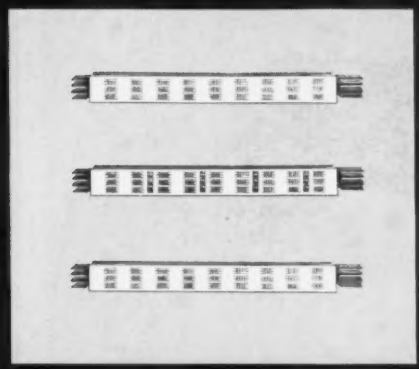
Rotary Handle Breakers



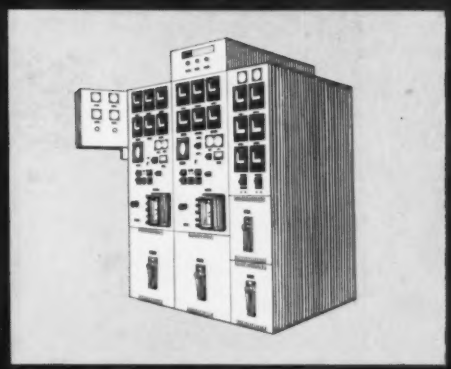
Motor Controls



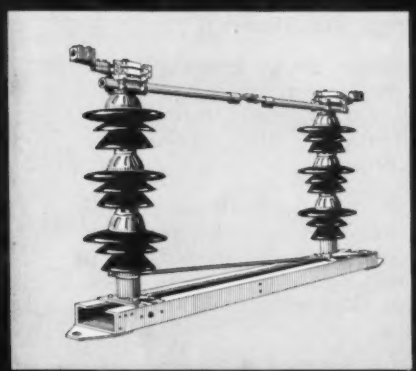
Motor Control Centers



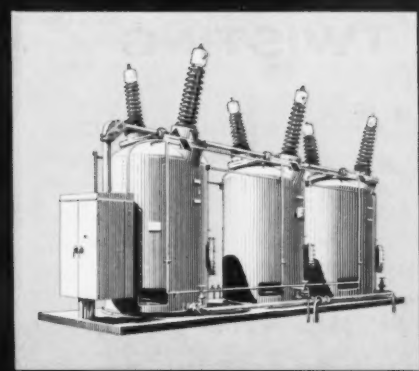
Modular Bus Duct



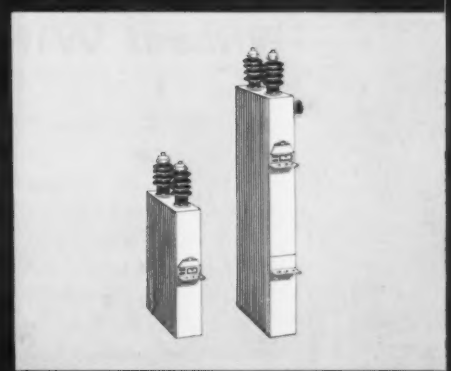
Metal-Enclosed LV Switchgear



Power Disconnect Switches



Oil Circuit Breakers



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fully-modular plug-in lines for circuit breaker and fusible load centers, with advanced Non-Interchangeability systems. If you have a stake in selecting the best in electrical control, distribution and power equipment for homes, commercial or institutional buildings, for industrial plants or utility systems, you will find the Federal Pacific Redi-Reference invaluable. We welcome your inquiry. Federal Pacific Electric Co., 50 Paris St., Newark 1, N. J.

FEDERAL PACIFIC ELECTRIC COMPANY

FPE

growth through creative energy

SPLICE

Without WIRE TWISTING

EXPECT THE BEST FROM BUCHANAN. For instance, Buchanan's new 2008S Steel Splice Caps make better wire splicing faster than ever. They won't pull off, twist off or shake off of even untwisted wires. Crimp with Buchanan's reliable C24 pres-SURE-tool.

The 2008S clamps conductors in a vise-like crimp. Its exclusive fluted design strengthens the cap, helping to position the 2008S in the tool, and serving as a starting point for the tool's indenters. When the 2008S Splice Cap is crimped, the flutes confine the conductors in a tight area. Wires are flattened and deformed lengthwise for wire-to-wire contact. There are no voids between conductors, thereby eliminating looseness.

You insulate completed 2008S splices with Buchanan's 2007 Snap-On Nylon Insulators. They go on with a snap; provide quickest insulation in shortest time—even on fine wires and in coldest weather.

Get complete details about the new 2008S Splice Cap now. Call your nearest Buchanan representative or write for Bulletin W-3.

Actual Size

Splice caps listed as "pressure-type wire connectors" and "fixture-type splicing connectors" for 2 #18 thru 4 #12's. Insulators UL and CSA listed for 600 v. on building wire and 1000 v. in fixtures, in applications up to 105°C. (221°F.)

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In Canada: ESNA CANADA LIMITED, Toronto 16

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TAL AGENCIES, INC. — SEATTLE, WASH.
KEELER WHITE-PORTLAND — PORTLAND, ORE.
FRANK ROZEMA — LOS ANGELES, CALIF.

► **Lenkurt Electric** Co., San Carlos, Calif., has filed suit for more than $4,000,000 against **General Electric** Co. in New York State Supreme Court, charging the corporation with obtaining valuable technical information by hiring away a group of three key Lenkurt engineers. The California company asserted in its complaint that G-E had been able as a result to obtain contracts from Western Union and Southern Railway for production of transistorized carrier-multiplex equipment. Profits from the contracts, which should have accrued to Lenkurt, amounted to $2.07 million, according to the complaint. Charging further that G-E reaped undeserved publicity by claiming to be developer of the equipment, Lenkurt is asking an additional $2,000,000 in damages on this count.

► **Okonite** has set up a new branch office in Denver with **James F. Angle** in charge. As Rocky Mountain District manager, Angle will continue to supervise activities at the company's Salt Lake City office. The new Denver headquarters are in the Enterprises Building at 2829 E. Second Ave., Denver 6.

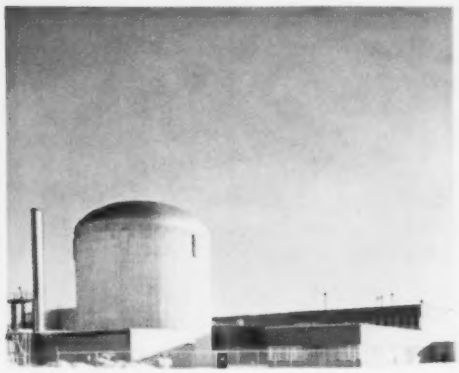
► Directors of **Utility Appliance** Corp. have accepted an offer by **Republic** Corp. whereby the latter would acquire Utility in a stock exchange deal. Basis of the agreement is one share of Republic common stock for 1.3 shares of Utility. Victor M. Carter, president and chairman of Republic, predicted that within 12 months after completion of the acquisition move annual sales of the combined companies would increase by 80% over fiscal 1960, to a total of more than $50 million. In acquiring Utility, Republic takes over a number of brand names, including Gaffers & Sattler electric and gas ranges, furnaces, air conditioners and water heaters. Utility owns and operates a 500,000-sq-ft plant and leases an additional 345,000 sq ft of facilities.

► **Graybar Electric** Co. has been appointed distributor for two-way radio communications equipment made by **Osborne Electronics** Corp. of Hawthorne, Calif. Osborne recently expanded its line to include a base station transceiver that is fully transistorized for use in the Class D equipment fields.

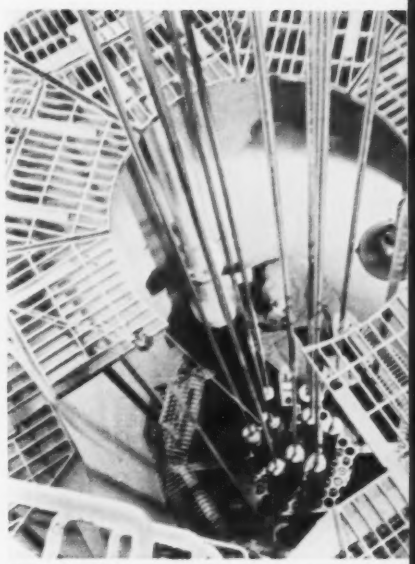
► **Randolph Engineering** Corp. has opened a new office in northern California at Menlo Park. Address is 1436 El Camino Real. **H. R. "Mac" McClain** is manager.

60,000 kw Westinghouse testing reactor speeds radiation tests for industry and government

Reactor Core. Nuclear fuels and other materials can be tested inside cylindrical fuel elements.



Testing Reactor Facility. Most powerful privately-owned complete facility in U.S. Available to serve industry and government.

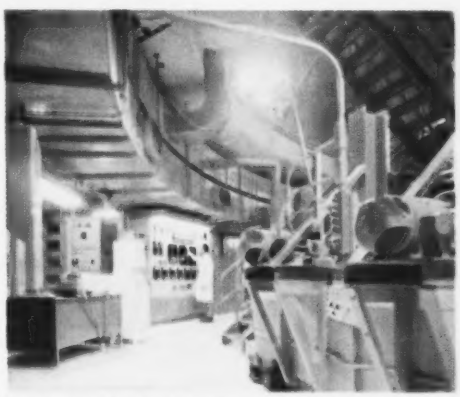


Critical Experiment Station. Low power test facility used to confirm physics of experiments before exposure in the reactor.

Remote Handling Facility. Hot cells and metallographic cells are available for post-irradiation examination of samples.

Master Control Room. This is focal point of the operating facility; providing remote indication of reactor performance and experimental conditions.

Complete Laboratory Facilities. Chemical, analytical and counting laboratories are used to make post-irradiation tests.

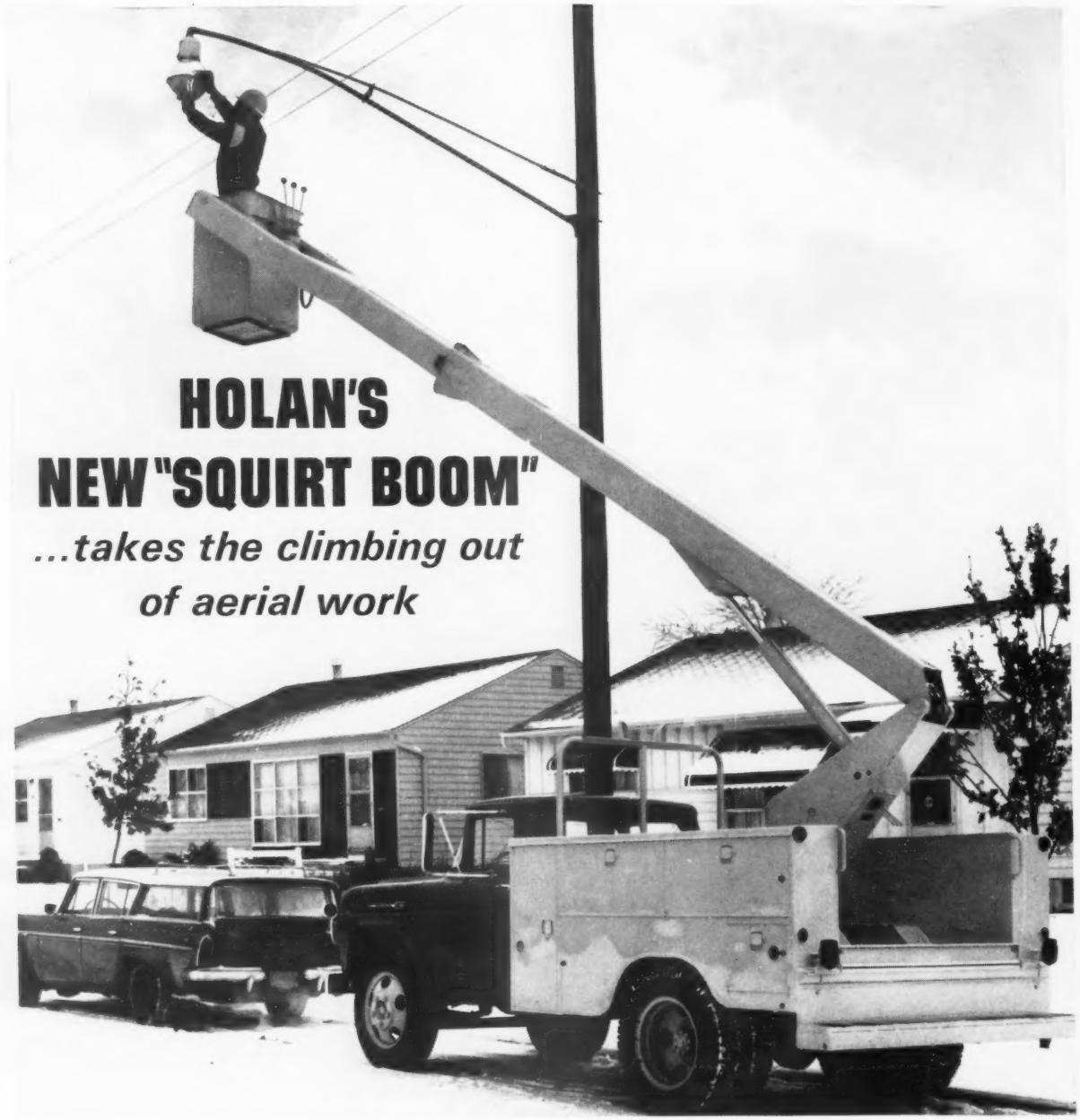


Test Loop Control Center. Loops are available to provide a variety of environmental conditions during irradiation.

JI-59502

Westinghouse

Westinghouse Testing Reactor
Box 868, Pittsburgh 22, Pa.



HOLAN'S NEW "SQUIRT BOOM"

...takes the climbing out of aerial work

Here it is — Holan's new all-hydraulic Squirt Boom. Ideal for troublemen . . . the fast, safe way to re-fuse transformers. Saves money in group lamp replacement work . . . no climbing up and down a ladder and material and equipment ride in the bucket with the man. Speeds such work as installing electric service, mid-span taps, traffic signal and street light maintenance.

Now one man can do many aerial tasks because he has complete control with levers mounted on the fiberglass bucket (boom and bucket tested at 73,000 volts (A.C.) bucket-to-ground). Telescoping fiberglass boom extends 10'7". . . raises to a 40-foot working height . . . rotates 360° in either direction. A hydraulic slave cylinder, located in fiberglass bucket yoke, keeps bucket level at all times.

Safe, dependable master-slave type controls are mounted on the bucket and on superstructure. Offset superstructure design and exclusive Holan torsion bars, attached to the body base, provide stability in all positions with a 300-pound payload . . . no outriggers needed.

Let us send you more details on the Holan Squirt Boom . . . designed and built for safe, fast, economical aerial work. Call your Holan Field Representative, or write us.

Holan Corporation, 4100 West 150th St., Cleveland 35, Ohio

Holan

Subsidiary of THE OHIO BRASS COMPANY

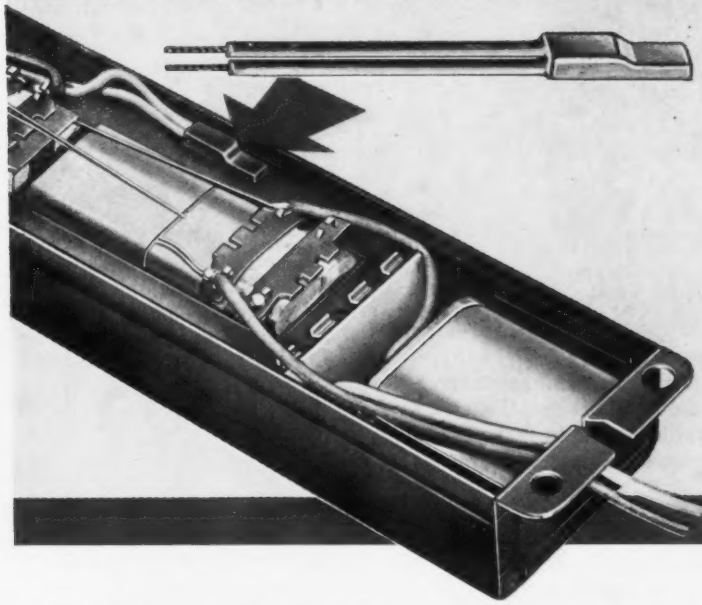
HOLAN

For phone number of closest representative see advertising index in back of book.

PROTECT FLUORESCENT LIGHTING INSTALLATIONS

with ADVAN guard®

FLUORESCENT LAMP BALLASTS



ADVAN-guard,® a thermally actuated automatic reclosing protective device, introduced by ADVANCE almost 3 years ago, is an integral part of every ADVAN-guard® Ballast. It is sensitive to voltage and current as well as temperature and protects against excessive voltage supply . . . internal ballast short circuiting . . . inadequate lamp maintenance . . . improper fixture application and eliminates the need for individual fixture fusing.

ADVAN-guard® is sealed in the ballast housing and pre-set to instantly and automatically trip out whenever the ballast is operating at higher than recommended temperatures. When heat decreases to normal operating temperature, ADVAN-guard® resets automatically and the ballast resumes operation, adding years to ballast life by preventing ballast operation at abnormal temperatures. To assure maximum protection for fluorescent lighting installations, provide ADVAN-guard® Fluorescent Lamp Ballasts. ADVAN-guard® is listed by Underwriters' Laboratories, Inc. Write for detailed literature.

"The Heart of the Lighting Industry"

ADVANCE®

CBM CERTIFIED

World's Largest Exclusive Manufacturer of Fluorescent Lamp Ballasts

TRANSFORMER CO.

2950 NO. WESTERN AVE. CHICAGO 18, ILL. U.S.A.

Manufactured In Canada by: ADVANCE TRANSFORMER CO. Ltd., 5780 Pare St., Montreal, Quebec, Canada

For phone number of closest representative see advertising index in back of book.

pat. pending

T&B's modular fitting system provides an economical solution to practically *every* interlocked armored cable installation problem. You can save the cost of installing baskets, ladders, troughs and trays — and still run Interlocked Armored Cable everywhere . . . vertically, horizontally, straight or curved. You support cable on walls, ceilings, pillars or beams with a mounting bracket no wider than a fitting . . . suspend it from messenger wire over long spans. You can make 27 *different* kinds of terminations — in dry, damp or wet locations — with or without separate ground. All parts have standard threads and are interchangeable. You can accommodate every armor diameter that falls within each knockout size in a continuous, overlapping range from ¾" to 4".

Contact your local T&B Distributor or write for Bulletin F5-47 to: The Thomas & Betts Co., Incorporated, Elizabeth 1, New Jersey. In Canada: Thomas & Betts Ltd., Montreal.

All Products Sold Only Through Authorized T&B Distributors

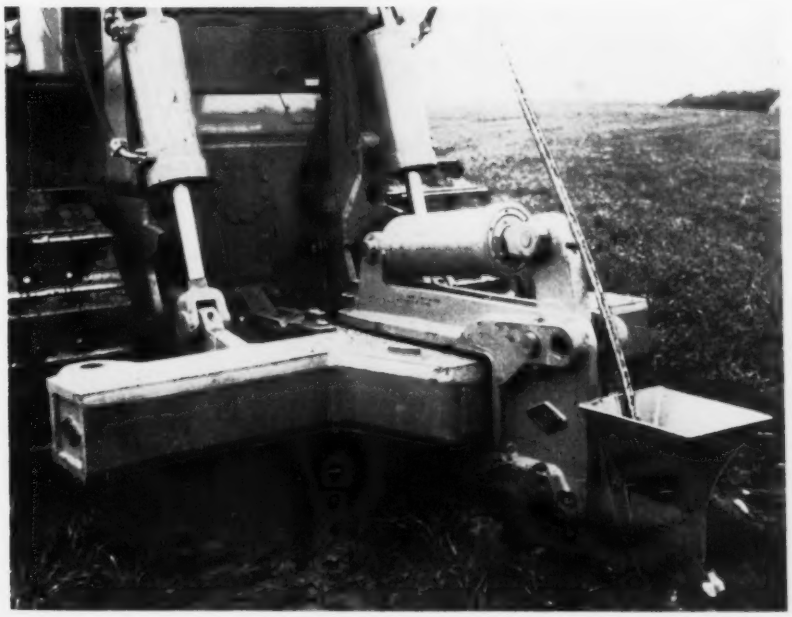
T&B ENGINEERED

THOMAS & BETTS

For phone number of closest representative see advertising index in back of book.

PRODUCT NEWS

New designs and applications

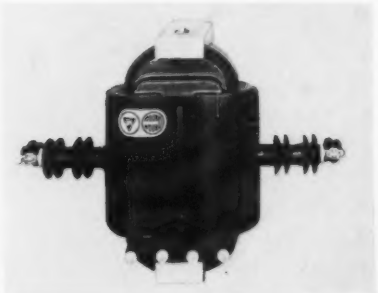


Cable-Layer Attachment

Designed to lay telephone or power cable, plastic, copper or aluminum pipe and conduit without trenching, a new line of cable-laying attachments for all popular makes of heavy-duty crawler tractors is now available from American Tractor Equipment Corp. of San Leandro, Calif.

A cable-laying shank mounted on the tool beam of the heavy-duty ripper opens up a cut and buries the cable or pipe in one continuous operation. Shanks for burial depths up to 72 in. are available. Cable or pipe is carried on suitable reels; several types of tractor mounted reel carrying devices are offered by Ateco to fit various job requirements.

Circle No. 1, coupon on p 96.



Encapsulated Distribution Transformer

Completely encapsulated distribution transformers are being produced by Line Material Industries. These transformers have undergone a six-year development and testing program and will be offered to selected utilities for further evaluation under actual operating conditions, according to the manufacturer. Present units are rated 15 kva, 2.4 through 7.62 kv. Additional ratings will be available shortly.

Circle No. 2, coupon on p 96.

Dimmer Switch

Ordinary single filament lamp bulbs can be operated at normal or 30% brightness with General Electric's new High/Low control. The three-position switch operates lamps at full brightness in the High position and at 30% brightness in the Low position. Off position is in the center so that either high or low may be switched on directly.

The switch is insensitive to loads and, on one line, will control several incandescent lamps of the same or different wattages within a 300-w maximum limit. In the low position, it utilizes a silicone rectifier to reduce power and lower light output.

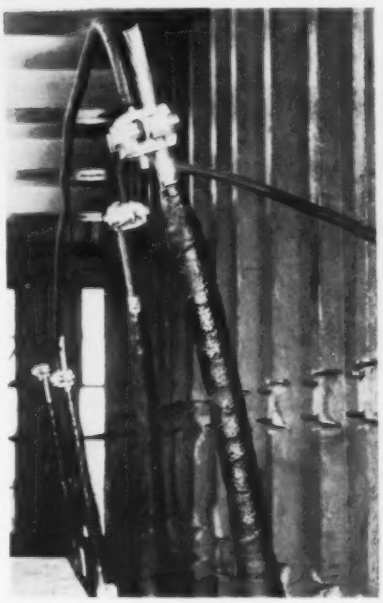
Circle No. 3, coupon on p 96.

Remote Alarm Indicator

Motorola Inc. has expanded its remote alarm indicator line to include units for mounting at the base of utility poles. The new model consists of a 25-w radio transmitter and a tone coding device, mounted in a pressurized transformer tank to ensure all-weather operation. The tank is covered by a steel hood to prevent tampering.

In most installations, the unit operates in conjunction with a recloser and is triggered if a line fault causes the recloser to lock out. The alarm signal is radioed to a base station notifying utility personnel of the occurrence and location of the failure.

Circle No. 4, coupon on p 96.



Potheadless Terminations

The Epoxylite Corp. of South El Monte, Calif., announces availability of its cable accessory kit for making hermetic potheadless termination on 15-kv paper lead cable. Use of the new kit is said to result in the elimination of potheads on 15-kv cable for indoor service, offering considerable cost saving.

Cable is prepared in the normal manner, with construction of conventional stress cone. Over this structure a laminate of special epoxy resin and orlon tape is then constructed by simple, brush-on techniques.

Circle No. 5, coupon on p 96.

KNOW YOUR SYMBOLS

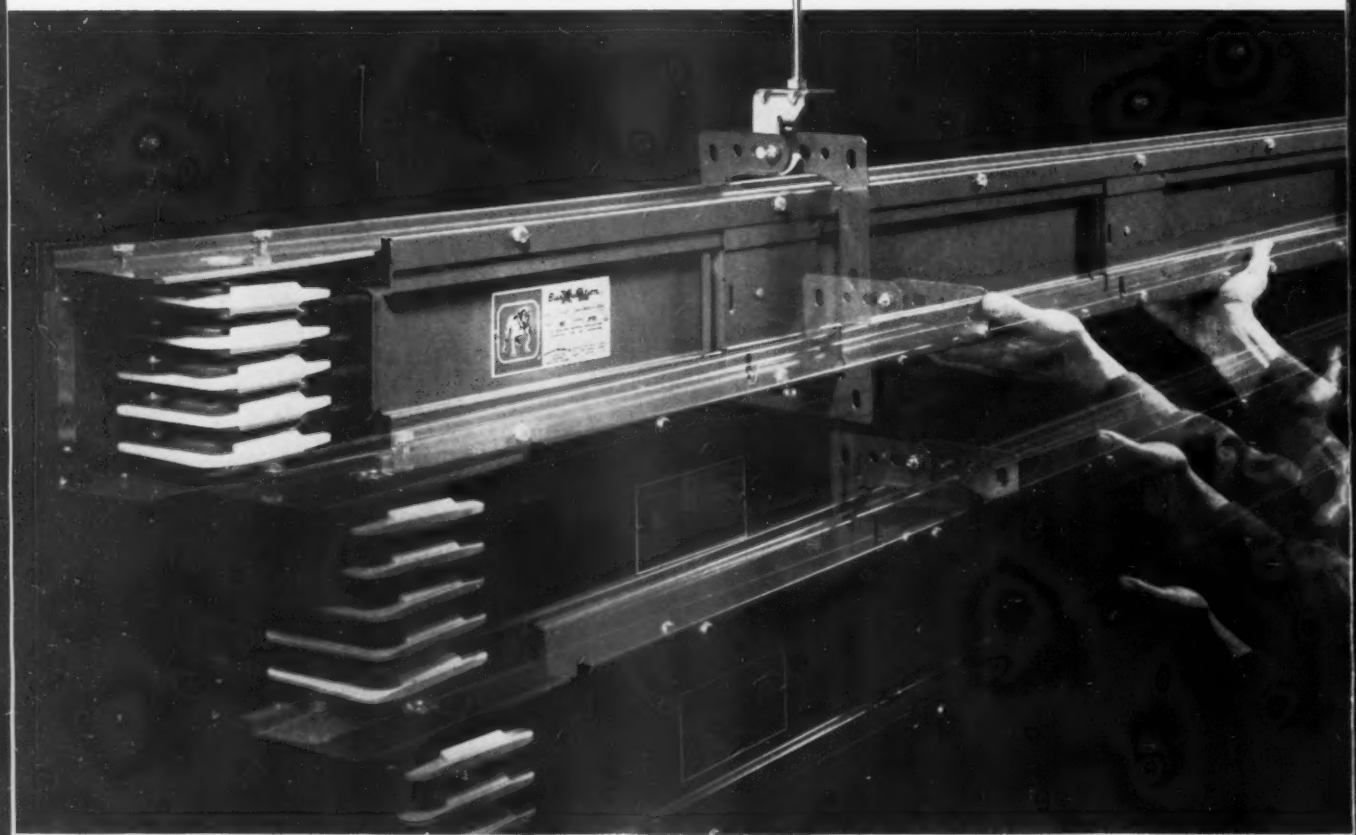
This symbol stands for bus duct

This symbol stands for QUALITY

NOW... BullDog plug-in duct hangs up to 50% faster

with new HANGFAST Adapter

New HANGFAST Adapter bolts quickly and tightly to suspension rod end . . . duct with standard hanger engages HANGFAST Adapter hook instantly . . . hanger bolt spins tight fast for a lasting, secure installation. Result—you can save as much as 50% in hanging time . . . end time-consuming bracket fabrication, too! And you can use the new HANGFAST Adapter with all types of BullDog industrial plug-in duct systems—XL, BD and LO-X®. Ask your BullDog Field Representative for a demonstration. Or write for details.



BullDog Electric Products Division, I-T-E Circuit Breaker Company, Box 177, Detroit 32, Mich. In Canada: 80 Clayson Rd., Toronto, Ont Export Division: 13 East 40th St. New York 16, N.Y

Consult the following Pacific Coast representatives:

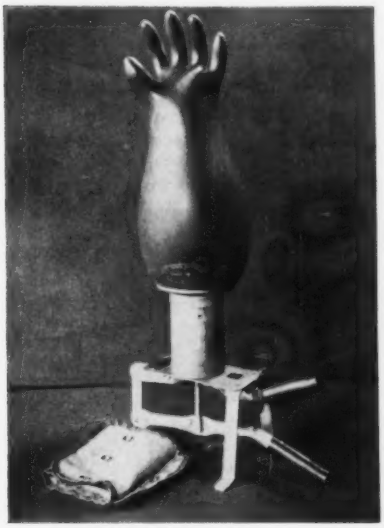
Coast Electric & Manufacturing Co.
1733 N. E. Seventh Ave., P. O. Box 7866
Portland 12, Oregon

Young Electric & Mfg. Co.
2134 Curtis St.
Denver 2, Colorado

Safety Switchboard Company
910-89th Avenue
Oakland 21, California

BullDog Elec. Prod. Co. of Los Angeles
3020 Supply Ave.
Los Angeles 22, California

I-T-E CIRCUIT BREAKER COMPANY
BULLDOG ELECTRIC PRODUCTS DIVISION

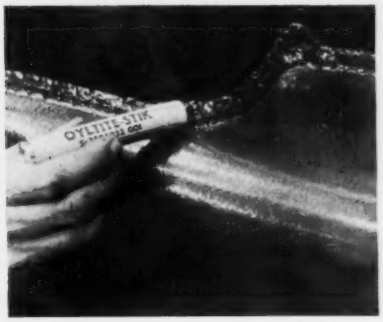


Portable Glove Tester

A device that tests linemen's gloves on the job quickly and efficiently has been announced by the E. D. Bullard Co. of Sausalito, Calif.

The testing operation is said to be quite simple and capable of being accomplished on the job in less than three minutes. The glove is clamped over the top of the tester, hand inflated and inspected. The tester comes in two sizes to fit all linemen's standard rubber gloves.

Circle No. 6, coupon on p 96.



Transformer Sealant

Westinghouse Electric Corp. announces a new transformer sealant called Oyltite-Stik for emergency sealing of transformer oil leaks through cracks or pinholes in welds or joints.

On occasions, oil immersed transformers may develop small oil seepage leaks that necessitate removal of the transformer from service. This new sealant can repair many of these leaks while the transformer is still in service, thereby eliminating costly service interruptions.

Circle No. 7, coupon on p 96.

Transformer Coating

RT&E Corp. announces that it will replace paint on distribution transformers with Armortec, a vinyl plastic exterior coating with high resistance to wear and weather. The coating will be applied to transformer cover, band and tank exteriors at no additional charge. Applied at thicknesses up to 20 mils and oven-cured at 650 F, the coating has excellent adhesion to the metal and high impact resistance that prevents chipping and scratching, according to the manufacturer.

Circle No. 8, coupon on p 96.

Unique Fastener

The Huck Mfg. Co. has announced a new fastening device for use in utility transmission towers and other outdoor structures.

The Huckbolt fastener is said to be neither a rivet nor a bolt, although it resembles the latter. It combines the desirable properties of both rivet and bolt while giving high strength, permanent, tamper-proof characteristics to fasteners.

Circle No. 9, coupon on p 96.

Fluorescent Lamp Ballast

A new "A" Quiet-Rated lamp ballast for operation of two 40-w rapid start fluorescent lamps has been announced by Advance Transformer Co.

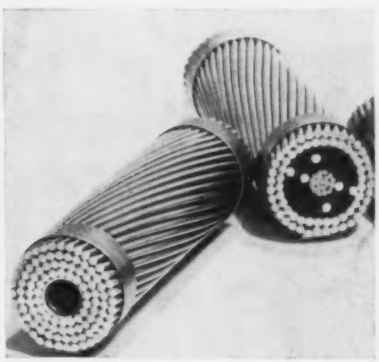
The acoustically corrected fluorescent ballast absorbs the magnetic vibration of the core and coil before it becomes sound, a new concept achieved with a thermo-pliable compound.

Circle No. 10, coupon on p 96.

Photo Controls

Lumatrol Mark 1, a new photo control by Micro Balancing Inc., is said to promise unprecedented reliability in automatic switching of street lights. The manufacturer claims the Mark I is unusually compact and lightweight, utilizing a simplified circuit employing Varistors in conjunction with a secondary lightning arrester.

Circle No. 11, coupon on p 96.

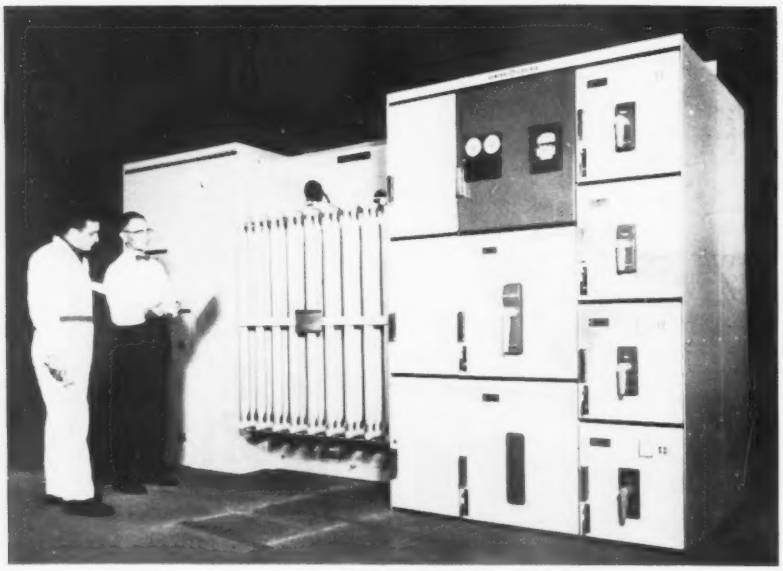


Expanded ACSR

The Rome Cable Division of the Aluminum Co. of America has developed two high voltage conductors for Bonneville Power Administration to be installed on its 460-kv test line. These conductors are of expanded design, but represent a departure in concept from the familiar ACSR.

One conductor employs a "rope lay" configuration measuring 2.13 in. in diameter. The other incorporates a flexible aluminum conduit as the expanding medium. The overall conductor diameter is 2.14 in.; the conduit is a standard .825-in.-od flexible conduit.

Circle No. 12, coupon on p 96.

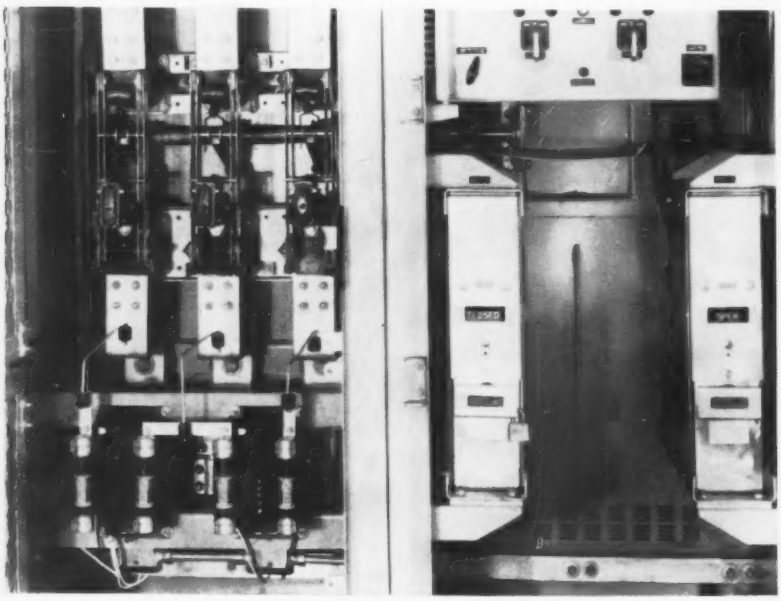


Compact Switchgear

A new design in low-voltage draw-out switchgear, which incorporates complete compartmentation of breakers, bus and cable termination, has been developed by General Electric's low-voltage switchgear department.

The new switchgear, as a part of a load center unit substation, is for use in industrial and commercial applications and in utility generating stations using 600 v a-c and below. G-E engineers say the new custom-line load center unit substation will provide greater service reliability, convenience and operator safety than conventional-type equipment.

Circle No. 13, coupon on p 96.



Electric Switchgear Operators

New electric operators have been introduced by S&C Electric Co. for its high voltage, metal-clad fused, load interrupter switchgear for industrial plants, commercial buildings and institutions.

S&C's electric operator uses a motor operated, worm driven gearhead powered by control circuits of 12 v to 250 v d-c, or 120 v or 240 v a-c. It can also be operated manually. An interlock switch prevents motor operation when crank is engaged.

Circle No. 14, coupon on p 96.

Trading Post

Space in the Trading Post is available at $4 per line per issue with a minimum of three lines – more than seven lines – $18 per inch. Write to Trading Post, Electrical West, 255 California St., San Francisco 11, Calif.

Eastern manufacturer of quality baseboard and panel heaters wants qualified representatives in Seattle, Portland, San Francisco and Los Angeles. Must have good distributor contacts. Refer to Dept. MR101.

Manufacturer of electrical radiant heating system wants northern California representatives. Refer to Dept. MR102.

Southern California manufacturer of transmission line construction specialties wants representatives in the Pacific Northwest and Rocky Mountain areas. Refer to Dept. MR106.

Sales engineer, 38, with seven years' service for one of country's largest corporations wants opportunity in small aggressive company. Location must be in the West. Refer to Dept. MR107.

Long-established manufacturers' representative organization with offices in northern and southern California is looking for recognized lines to round out distribution equipment package for electric utility customers. Warehouse facilities available. Refer to Dept. MR109.

Major style leader bringing out new line needs representation in states of Arizona, Nevada, Colorado, Utah, New Mexico, Idaho, Montana, Wyoming as well as cities of Los Angeles and San Diego, Calif. Man must have following and experience with electrical distributors. Please state qualifications, experience and references. Refer to Dept. MR110.

Large West Coast consulting engineering firm would like to review experience record of well-qualified electrical power distribution engineer with a view to augmenting its staff early in 1961. Refer to Dept. MR111.

Overseas experience for sale. Seven years in Europe, Africa and India make me qualified to handle your export business. Sales records in each assignment. Refer to Dept. MR112.

Jaybird Powerhouse and Camino Dam, recently completed as part of Sacramento Municipal Utility District's Upper American River Power Project. Engineering design and construction supervision by Bechtel; powerhouse and penstock construction by Pacific Bridge, dam by Gibbons and Reed.

Bechtel Experience at Work:

HYDRO

Direct experience with hydroelectric and water projects covers more than a third of a century, including a major role in the construction of Hoover Dam by Six Companies Inc.

Projects designed in the past several years have a constructed value of $400 million. Nearly two million kilowatts is presently under design for future construction.

Bechtel also provides every required service under single responsibility in steam and nuclear power.

BECHTEL CORPORATION

Engineers and Builders for Industry

SAN FRANCISCO • Los Angeles • New York • Houston

Canadian Bechtel Limited

TORONTO • Montreal • Calgary • Vancouver

BECHTEL

When you select a size and grade of strand for a specific job you want to know that it meets every requirement of that job. You want ample strength to sustain the ultimate load—plus an adequate safety factor. You want pliability for ease of working in the field. You want ruggedness to withstand the abuse which may be encountered during and after installation. You want long, dependable life. And, you want reasonably low first cost and low maintenance costs.

For more than 50 years *Crapo* Galvanized Steel Strand has consistently demonstrated its ability to more than meet all of these requirements. Proof of its reliable performance is to be found in the case histories of overhead power and communication lines throughout the country.

Crapo Galvanized Steel Strand is fully protected against corrosion by heavy, uniform, dense coatings of commercially pure zinc tightly bonded to the individual wires. All grades and sizes are available in A, B and C weights of coating.

For details, ask our distributor or write direct!

INDIANA
STEEL & WIRE
COMPANY, INC.
Muncie, Indiana

BULLETINS

For fast action in securing the manufacturers' literature listed below and more information on new products described in the preceding pages, use the coupon below. Circle the items wanted and mail to Electrical West

TRANSFORMER TIPS—A 52-page pocket manual of general information, operating and maintenance tips and connections for pole-type distribution transformers is offered by Allis-Chalmers. This booklet includes tables and charts covering pole-type transformers 167 kva and smaller, 15,000 v and below. It is of particular interest to distribution system operating personnel and is designed as an aid in training. For a copy of this manual, 61X9659, circle No. 15 in the coupon below.

CONNECTORS—New data and price sheets on Bronco electrical connectors and accessories are available from Western Insulated Wire. For a copy circle No. 16.

DUCT—A six-page folder containing updated information on Transite electrical duct is offered by Johns-Manville. Containing data on all fitting and dimensions, TR-271A is made up as a spread sheet. Circle No. 17.

DATA BOOKLETS — For rural electric power line engineers, Alcoa's Rome Division is offering a "Book-of-the-Month" in the form of a revised and expanded edition of its Rural Line Engineering Data Booklets. Superseding the previous edition of nine booklets, the new four-booklet series, gives latest data for a wider range of ACSR, from AWG6 to 4/0. Circle No. 18.

AUTOMATION—Bulletin G-101 from Babcock & Wilcox presents a study of the current status and future of boiler automation. Written by G. W. Kessler, it was originally given as a paper to the ASME-AIEE Power Conference. Circle No. 19.

THINLINE MOTORS—Features and advantages of its new Thinline motors for limited space applications are listed in an eight-page bulletin from General Electric. For GEA—6927B circle No. 20.

LOAD CENTERS—Data on a new line of circuit breaker load centers is presented in a two-color catalog offered by Bryant Electric. A simplified guide to panel selectors is featured and a panel catalog numbering system is described. Wiring diagrams and dimensions are given. For a copy of C-200 circle No. 21.

CUTOUTS—A revision of Bulletin 541 on Positect enclosed distribution cutouts is available from S&C Electric. Circle No. 22.

LIGHTING—A 36-page publication, "Your Guide to the Latest in Recessed Lighting," is offered by Smoot-Holman. Mounting information, coefficients of utilization and photometric data are given. A companion 8-page brochure on commercial installations is available. Circle No. 23.

FITTINGS—Aluminum fittings said to contain less than 1% copper content are described in Bulletin AL60 from Appleton Electric. Circle No. 24.

INSULATOR—Struts, a line of high-voltage insulators, are described in Lapp Insulator's new brochure, "Controlled Position Construction." For Bulletin 478R circle No. 25.

CONNECTORS — Connectors for coaxial cables are listed in a publication from Phelps Dodge. Included are new connectors for aluminum sheathed, high frequency Styroflex and Foamflex coaxial cables. Circle No. 26.

M-V LAMPS—A manual on mercury-vapor lamps has been published by Westinghouse. It contains data on output, ratings and electrical and physical characteristics. Circle No. 27 for this 28-page booklet.

ELECTRICAL WEST *Not good*
255 California St., San Francisco 11, Calif. *after May 1*

Please send me, without obligation, the new product information or catalogs.

If described in Product News, circle item number

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
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If described in advertising, fill in page number

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NAME ..... **TITLE** .....

COMPANY .....

ADDRESS .....

CITY ..... **ZONE** ..... **STATE** .....

***Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.**

Introducing –

AMERICAN-Standard ELECTRI-WARM

A NEW AND COMPLETE ELECTRIC HEATING LINE!

American-Standard is the greatest name in home equipment—our products are in every American home.

When you're selling American-Standard equipment, you don't have to sell the name—you capitalize on it.

Just look over the brand-new ELECTRI-WARM line of electric heating equipment—it's one of the most complete in the industry.

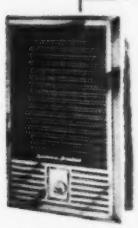
American-Standard is an acknowledged leader in the design and manufacture of coal, oil and gas fired heating equipment. Therefore, it should come as no surprise that we now excel in the use of electricity as a heating fuel.

Portable Heaters—Three slim, compact 220-240 volt models available—all fan forced. Models 300 and 302 have two heat ranges—Model 301 has one heat setting but has a high CFM and static. All models utilize instant-heat elements, safety cutout protective devices, and automatic thermostat controls.

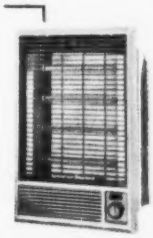
Ceiling Insert—Four-in-one combination heater—light—exhaust fan—air circulator.

Special four-way switch provides any single or multi-function operation.

RADIANT — **FAN FORCED**



Series 100—Built-in radiant bathroom heaters feature ribbon-type chromium-nickel heating elements for instant heat; easy-to-clean, high quality chrome exterior. Installed in old and new construction; available in 1000 and 1500 watt, 120 volt power supply.



Series 110—An all-purpose built-in radiant heater utilizing splashproof, thermal shock-proof Vycor tubing which houses chromium-nickel heating elements. 1500, 2000, 3000 watt models designed for 120 and 240 volt power supply.

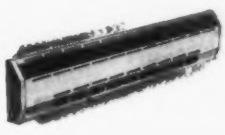
Series 120—Beautiful built-in fan-forced black heat close mesh faced bathroom heaters; feature long-life chromium-nickel heating elements—automatic thermostats for controlled heat—quiet shielded motor—no TV interference. Available in 1500 watt are designed for 120 or 240 volt power supply.

Series 130—Heavy-duty built-in fan-forced black heat horizontal louvre faced electric wall heaters. Push-button controls allowing fan use for heating or cooling—chromium-nickel elements—automatic thermostat. 1500, 2000, 3000, and 4000 watt models designed for 120 or 240 volt power supply.

Electric Heating Cable Series 5000 (ceiling and floor)—Cables are stapled to ceiling laths, then covered with plaster or fibreboard. Floors installations are laid out in a similar pattern with concrete slab poured on top. Cables are spooled in standard reel sizes with end connectors attached.

Economy Series—Practical, competitively priced. Efficient fin-type element, mounted in an attractive housing with wide-spread inlet and outlet areas for easy cleaning, fast heat liberation. Satin-like white finish; easy installation; center, end, and wall thermostats; 5 models—750, 1000, 1250, 1500, and 2000 watts.

Standard Series—Heating element consists of two nichrome wire coils in ceramic insulators, which permits half or full capacity operation. Two stage built-in or wall-mounted thermostat. Heater comes as complete unit in lengths of 2', 3', 4', 6', 8' and 10'. Six models—500, 750, 1000, 1500, 2000, and 2500 watts, designed for 240 volts.



Deluxe Series—Compact—just 6" high, 2" deep, heating element is rod type, welded to continuous radiant fins and mounted on floating holders that permit soundless expansion and contraction. Highest quality chrome plated grill; 840, 1340, 1840, and 2840 watt models in 3', 4½', 6', and 9' lengths all designed for 240 volt power supply.

Ceiling Panel Series 600—Ideal for home, store, office, factory—easy to install—two types—(A) screw mounted unit that can be painted, (B) acoustical motif tile-faced unit for drop-ceilings—pre-wired and shipped complete—no assembly needed—connects to standard line voltage—wall thermostat. Two models—500 watts at 120 volts, 750 watts at 120 volts.

Controls—The American-Standard ELECTRI-WARM line includes a complete selection of electric heating controls and deluxe wall thermostats of the low voltage and line voltage types for all uses. These include the popular and fast-selling Weather Station and the Zone Control.

Would you like to know more about American Standard ELECTRI-WARM, the newest and most complete line of electric heating equipment? Would you like to learn of the advantages of this prestige line? For further information write to: American-Standard Air-Conditioning Division, 40 W. 40th Street, New York City or contact your local American-Standard distributor.

American-Standard and Standard® are trademarks of American Radiator & Standard Sanitary Corporation

AMERICAN-Standard

AIR CONDITIONING DIVISION

For phone number of closest representative see advertising index in back of book.

STANDARD ENGINEER'S REPORT

Chevron OC Turbine Oil helps pump a river over Eagle Mountain!

12,000 gallons of water a second are forced over Eagle Mountain by the big pumping station near Desert Center, California. This station is one of five pumping plants on the 654-mile Colorado River Aqueduct System, longest and largest domestic water supply line in the United States.

Chevron Turbine Oils have been used here for over 20 years to lubricate all bearings in 200 cfs Worthington centrifugal pumps and 12,500 hp Westinghouse and Elliott motors. These three-story pumping units are continuously subjected to start and stop duty which is hard on bearings and on lubricants. Yet, in over two decades of service there has never been a lubrication failure.

O. J. Thompson, Station Chief, reports: "At our last major inspection, bearing surfaces showed only minimum normal wear. Chevron Turbine Oils have given outstanding performance ever since the plant was opened in 1939."

This vast aqueduct system is owned and operated by the Metropolitan Water District of Southern California. It supplies a billion gallons of water a day to 5 Southern California Counties, including 90 incorporated cities.

Standard Lubrication Engineers, working with MWDSC personnel, recently completed a thorough analysis of all lubricants and equipment in the system . . . to assure economical lubrication and high quality performance throughout.

Lubrication Problems? Let a technically qualified Standard Engineer help you. The largest field force of lubrication engineers in the West is at your service. For this valuable free technical help or for information on any petroleum product, just call your local Standard office, or write Standard Oil Company of California, 225 Bush Street, San Francisco 20.

CHEVRON Industrial Lubricants

STANDARD OIL COMPANY OF CALIFORNIA

TRADEMARK "CHEVRON" AND CHEVRON DESIGN REG. U.S. PAT. OFF.

For phone number of closest representative see advertising index in back of book.

Proposed Western Projects

Pacific Southwest

Phoenix, Ariz., General Electric Co., computer division plant addition, $4,000,000.

Arlington, Calif., Alberd Unified School Dist., intermediate school, $1,240,559.

Hollywood, John B. Kilroy & Associates, 11 buildings, including offices, motel, garage, heliport and parking, $18 million. Plans by Cejay Parsons, Los Angeles.

Huntington Beach, Union High School Dist., high school, $1,000,000. Plans by Neptune & Thomas & Associates, Los Angeles.

Ontario, Chaffey High School Dist., $1,000,000. Plans by Harnish, Morgan & Causey.

Oxnard, Union High School Dist., high school, $2,000,000. Plans by Fisher & Wilde, Ventura.

San Gabriel, Boran Bowling Enterprises, five-story office, $1,000,000. In care of Thonis, Harrison & Wolfe, Inglewood.

Alaska and Hawaii

Anchorage, Alaska, Anchorage City, electric generating plant, $2,024,000. R. W. Beck & Associates, Seattle, Wash., engineers.

Honolulu, Hawaii, Kuakini Hospital, hospital expansion, $1,500,000. Plans by Fuchino & Fuchino Associates.

Honolulu, R. C. Yap & Co., 30-story office, $10 million. Plans by I. M. Pei & Associates, New York; Weiskopf & Picksworth, New York, and Don Lo, Honolulu, structural engineers.

Honolulu, YMCA, building, $1,500,000. Plans by Law & Wilson.

Waikiki, Finance Investment Co., seven-story office, parking, $1,500,000. Plans by Lemmon, Freeth, Haines & Jones, Honolulu.

Waikiki, Tower Development Co., 10-story apartment, swimming pool, $1,200,000. Plans by Edwin N. Bauer, Honolulu.

Pacific Northwest

Crofton, B. C., British Columbia Forests Products Ltd., newsprint mill, $25 million.

Duncan, Cowichan Dist. Hospital Assn., three- and five-story T-shaped hospital, $2,000,000. Plans by Townley & Matheson, Vancouver.

Fort St. John, Sisters of Charity of Providence, two- and three-story hospital, $1,700,000. Plans by Gardiner, Thornton, Gathe & Associates; Read, Jones, Christoffersen, consulting engineers.

Langley, Evangelical Free Church of America, Christian college, $5,000,000. Plans by R. W. Wilding, Vancouver.

Langley, Langley Memorial Hospital, 100-bed hospital, $2,760,020. Plans by Gardiner, Thornton, Gathe & Associates; Read, Jones, Christofferson, consulting engineers.

New Westminster, Julius Balshine, seven-story hotel, $2,000,000. Plans by Lort & Lort, and I. M. I. Waldman, consulting engineer, Vancouver.

Vancouver, Vancouver General Hospital, gynecological and obstetrical hospital renovations, $2,000,000. Plans by Townley & Matheson.

Vancouver, B. C. Electric Co., transmission line between Bridge River power project and Cheekeye substation, $2,300,000. International Power & Engineering Consultants.

Rocky Mountain

Boulder, Colo., State Planning Commission, Denver, administration building, University of Colorado, $1,000,000. Plans by Meyer & Ayers, Baltimore, Md.

Boulder, State Planning Commission, Denver, 1,000-unit dormitory, University of Colorado, $3,000,000. Plans by Hobart D. Wagener, and W. C. Muchow and Fisher & Davis, Denver; Ketchum, Konkel & Hastings, Denver, structural engineers.

Boulder, State Planning Commission, Denver, married students housing, University of Colorado, $3,000,000. Plans by DeMars & Reay, Berkeley, Calif.

Brighton, School Dist. No. 27-J, voted $1,700,000 bonds, elementary school, $525,000, Earl C. Morris, Denver, architect; junior high school, $805,000, Atchison, Kloverstrom, Saul & Atchison, Denver, architects.

Denver, University Management Corp., University of Denver, two 12-story, 200-unit apartments, four three-story apartments, approximately $10 million.

Denver, Hampshire Investment Co., 82-unit, 15-story apartment, $1,100,000. Plans by Donald R. Roark.

Denver, Porter Hospital, 100-bed hospital wing, $2,250,000. Plans by Fisher & Davis.

Denver, Western Farm Bureau Life Insurance Co., nine-story office, two-story parking garage, $2,200,000. Swanson-Rink & Associates, consulting engineers; Anderson & Koerwitz, structural engineers.

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Shorter styled, modern, flanged duplex telephone and receptacle nozzles in satin brushed brass or anodized aluminum. Standards fit ½" opening. ¾" stems available. Also grounded receptacles.

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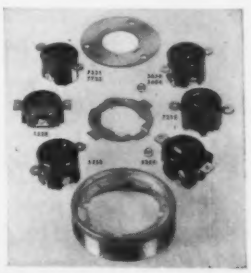

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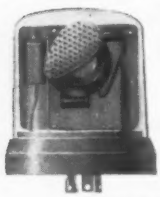

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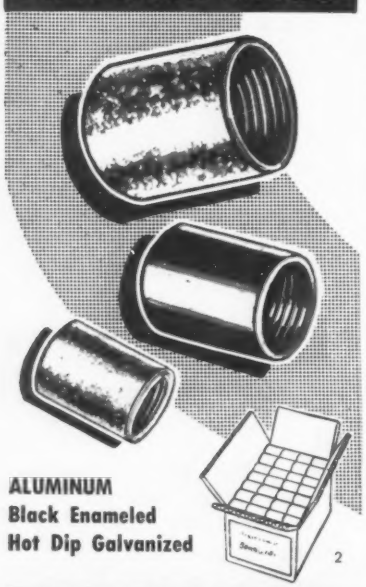

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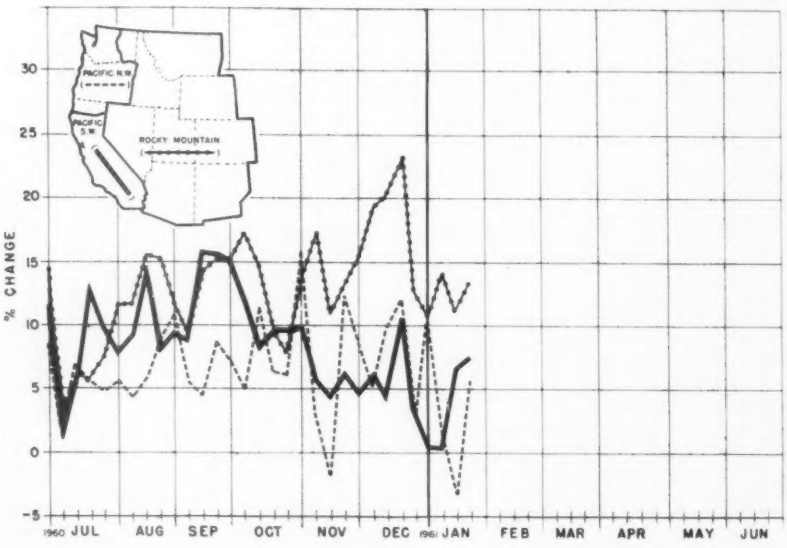
WESTERN BUSINESS TRENDS &

Output Comparisons

Year-to-Year Kwh Output Changes. Per Cent Change Over Same Week One Year Ago for Region as Indicated in Keyed Map



Foreign Equpiment

Bureau of Reclamation bid awards for electrical equipment and supplies from foreign manufacturers totaled $2,681,700 in the 1960 calendar year compared with $2,139,400 in 1959.

Contracts were awarded 23 foreign firms in 1960 and 21 in the previous year. Foreign companies have been bidding for USBR contracts since the policy was introduced in 1954 by President Eisenhower.

The foreign bidders must overcome two preferences given U. S. suppliers to win the contracts. All U. S. suppliers receive a 6% preference and if the company bidding is from an area designated as depressed by the Labor Department it is granted another 6% preference.

The Denver headquarters for the bureau said it currently has two engineers in Europe and another in Japan checking on the quality of generators, turbines and other equipment being supplied for USBR's power projects.

RELATIVE WHOLESALE PRICES OF ELECTRICAL MATERIAL

	Latest Month	Previous Month	Year Ago
Wire and cable	129.1	129.4	141.8
Watt-hour meters	120.9	120.9	120.9
10-hp motors	132.0	132.0	154.9
225-hp motors	208.8	208.8	223.9
Hydro generators	185.5	185.5	198.5
Steam generators	203.5	203.5	203.5
15-kva transformers	133.0	133.0	133.5
50-kva transformers	134.7	134.7	141.2
500-kva transformers	147.1	147.1	160.0
Dry-type transformers	133.7	133.7	149.6
Switch and fuse panelboards	126.0	126.0	132.4
Circuit breaker panelboards	137.9	137.9	139.1
Indoor oil circuit breakers	182.5	182.5	182.5
Outdoor oil circuit breakers	156.3	156.3	213.5

Source: McGraw-Hill Department of Economics

INDICATORS

Economy at a Glance

Year Ago	Month Ago	Latest Month
5316	5928	5905

PERSONAL INCOME in millions—seasonally adjusted as of Feb. 15 (An index of consumer spending potential)

7818.8	8250.8	8176.3

NONFARM EMPLOYMENT in thousands (An index of total industrial and commercial activity)

1912.8	1998.5	1938.7

MANUFACTURING EMPLOYMENT in thousands (A measure of manufacturing activity)

25.6	26.2	21.6

HOUSING STARTS in thousands of units (Index of new residential customers)

43,310	58,158	69,020

INDUSTRIAL BUILDING CONTRACTS in thousands of dollars (A rough index to the dollars of electrical contracting business six months to a year ahead)

USE ELECTRICAL WEST's

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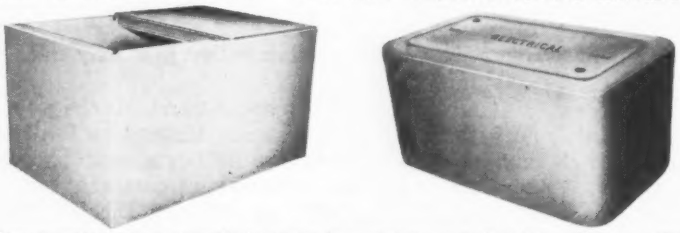

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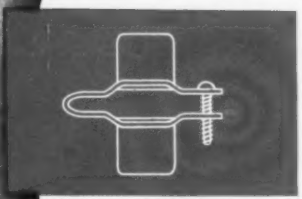

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